

MARINE REVIEW

Entered at Cleveland Post Office as Second-class Mail Matter.

VOL. XXII.

Published every Thursday at 418-19 Perry
Payne Bldg., by the Marine Review Pub. Co.

CLEVELAND, O., NOV. 15, 1900.

Subscription \$3.00 a year.
Foreign \$4.50 a year.

No. 20

SHIPS IN SECTIONS.

AMERICAN SHIP BUILDING CO. IS PREPARING TO BUILD THEM ON THE GREAT LAKES FOR SALT WATER SERVICE.

The American Ship Building Co. (consolidated yards of the great lakes) is arranging to build in sections ships for salt water service. Plans have been prepared at the headquarters of the company in Cleveland for a type of freight steamer that is to be built in two parts at lake yards and the parts joined together after passing through the Canadian canals of the St. Lawrence. This was done several years ago with the steamers Mackinaw and Keweenaw, built at West Bay City, Mich., but the Mackinaw and Keweenaw were small vessels compared with the kind of ship now under consideration, and parts of a vessel passing down the St. Lawrence now would have the advantage of canal navigation, as against the hazardous undertaking of shooting the rapids before the canals were completed. The type of vessel which it is now proposed to build in two parts at lake yards for salt water is to be of about 350 ft. length, 43 ft. beam and 27 or 28 ft. depth. These dimensions might be increased, especially as to length in a vessel passing through the canals in two parts, but for the limit of width in the locks. Of course the length of the ship can not be increased out of proportion to the width. It is figured that on the 14-ft. draught of the canals the two parts of a vessel of 27 or 28 ft. depth may pass safely when without cargo or other unnecessary weights.

That officials of the American Ship Building Co. are in earnest in the matter of providing new steel vessels for the Atlantic coast in this way is shown by recent correspondence between Mr. R. C. Wetmore, secretary of the company, and Mr. E. T. Chamberlain, United States commissioner of navigation. Mr. Wetmore a few days ago submitted to the commissioner the following hypothetical case:

"A vessel is built, say here in Cleveland, set up on the stocks in the usual way, the hull fully completed excepting for a space of say two plates in or near the center. These plates during the time that they are on the stocks would simply be bolted. A bulkhead would be constructed on either side of these spaces, and when the hull was fully completed in other respects, these plates would be removed, stored in one end of the ship, and the hull launched in two pieces. The hull would be sufficiently completed on the stocks to admit of measurement, although probably the deduction could not be made until after the two parts had again been put together, and the houses put on. We would then propose that the part of the hull containing the machinery would tow the other part through the canals to, say Montreal or Quebec, where the two sections would be joined together and continue to the coast."

"In reply to your inquiry whether such a vessel could be enrolled as an American bottom," says the commissioner of navigation, "and hail from an American port, and whether she would be liable to customs duties, this office has to state that if such a case should arise the dispatch of the vessel to the Atlantic coast without penalties, or disabilities other than those imposed by the nature of the case, would undoubtedly be authorized on the receipt by this office of proper evidence satisfactorily establishing the facts. It would probably be necessary to have evidence forwarded from the office of the collector of customs of the district where the voyage commenced and also of the collector where the voyage terminated. At the latter port proceedings could be taken for the granting of documents on compliance with the regulations. Enrollment would not issue at the port of departure. It is not understood that duties would accrue. As advised at present, the bureau of navigation would endeavor in every proper way to facilitate such a transaction."

ANOTHER SHIP YARD IN THE CONSOLIDATION.

The American Ship Building Co. is now in control of the works of the Union Dry Dock Co. at Buffalo. Negotiations were concluded on Friday last when President W. L. Brown, Vice-President R. L. Ireland, Gen. Mngr. James Wallace, and Mr. Jas. H. Hoyt, attorney, representing the consolidated yards, visited Buffalo for the purpose of executing the necessary legal forms. The real estate could not be bought, and was therefore leased from the Erie Railroad, but the plant has been purchased outright. In compliance with New York laws the two Buffalo yards will maintain an existence separate from the parent organization, with Edward Smith of Buffalo as president. It is understood that Mr. Edward Gaskin is to be retained as superintendent. This gives the American Ship Building Co. control of all yards that build steel ships on the lakes, excepting the Craig works at Toledo and the works of the Jenks Ship Building Co. at Port Huron.

AMERICAN STEAMSHIP CO.'S FLEET SOLD.

As foreshadowed in the Review of last week the American Steel & Wire Co. has acquired the twelve steel steamers of the American Steamship Co. The following are the steamships sold: J. J. Hill, J. W. Gates, Isaac Ellwood, William Edenborn, Superior City, Empire City, Crescent City, Queen City, Zenith City, W. H. Gilbert, W. P. Palmer, A. B. Wolvin. The capital stock of the American Steamship Co. was \$3,000,000. The price paid by the American Steel & Wire Co. was \$5,250,000—in other words the company paid \$1.75 or \$2,250,000 premium on the stock to get possession of the fleet. John W. Gates and his associates, who organized the steamship company, have therefore realized largely from its sale.

The establishment of a light by Canadian authorities on the shoal to the southward of Stag Island and the removal of the wreck of the Fontana render the continuance of the red and black horizontal striped buoy on the south end of the shoal extending to the southward of Stag Island, and the two black spar buoys placed off Ft. Gratiot light station to mark the west edge of the channel opposite the wreck of the Fontana, no longer necessary. They are therefore discontinued.

FORECAST OF SECRETARY LONG'S REPORT.

Secretary Long is engaged in the preparation of his annual report, and it is now regarded as certain that the construction program which he will recommend to congress will not be nearly so comprehensive as in other years of his service in the navy department. There is reason to believe that there has been no change in the disposition of the navy department, which was discussed recently in the Review, to ask congress to provide this year only such gunboats and supply and training ships as are absolutely necessary for the navy, omitting any armored vessels from the program. The department, it is believed, will urge that the money which ordinarily would go for the construction of battleships and armored cruisers should be applied this year to providing a necessary increase in the number of enlisted men. The navy has not enough blue-jackets to fully man the ships in commission, and no provision has been made for crews for the many large vessels under construction or authorized. The main reason, however, for the department's indisposition to recommend an extensive building program is that there are now so many ships to be built under authority and appropriations granted by congress that no time would be gained by increasing the list. Besides, the bids for the construction of eleven armor clads have not even been opened. Chief Constructor Hichborn has submitted his minority report as a member of the board on construction, in which he opposes the program of the majority of the board for the construction of thirty-six new ships. He recommends that the program be limited to three battleships, three protected cruisers of great speed, as high as twenty-four knots, and twelve gunboats. This report, that of the majority of the construction board, and another from the general board of the navy, of which Admiral Dewey is president, recommending the construction of fewer ships than proposed by the construction board, but more than the number Admiral Hichborn wants, are now before Secretary Long and are receiving his consideration in the preparation of his annual report. It appears to have been settled that the secretary, in making his recommendations, will, in justice to the general and construction boards and Admiral Hichborn, call attention to the building programs which they have proposed.

ANOTHER CONSTRUCTION BOARD CONTROVERSY.

As showing the feeling which exists among the members of the naval board of construction the latest controversy is an illustration. Rear Admiral Hichborn, chief constructor of the navy and a member of the board, went to Weymouth, Mass., last week to attend the launching of the torpedo boat Lawrence. While he was away the four other members of the board held a meeting and made a new distribution of the work coming under each bureau in the work of constructing the battleships last authorized, taking from Admiral Hichborn's charge some of the engineering work, placing it under the steam engineering bureau, and placing under the ordnance bureau the control of hoods for covering towers and hull plates, hitherto under Admiral Hichborn's bureau. These changes to be effective must be sanctioned by the secretary of the navy. The board also recommended to the secretary that Admiral Hichborn be required to use the impersonal term "bureau of construction and repair," instead of the personal title of chief constructor in the specifications for the new battleships and the directions to prospective bidders as to where to apply for plans. The majority of the board contended that the bureau of construction, and not the chief constructor, was the responsible party in such cases, and, furthermore, that the heads of other branches of the navy department had merged their personalities into the bureaus which they controlled. Admiral Hichborn will make a protest to Secretary Long against the action taken by the board in his absence. His friends say that the board wants to deprive him of the title of chief constructor. It is said that he will contend in his protest that by placing certain work under the ordnance bureau the board recognizes the protection material required as armor, and the government will be obliged to pay for it the high prices asked for armor plate, nearly \$500 a ton, whereas the construction bureau buys it as construction material at about \$150 a ton.

WORK OF DETROIT MARINE POST OFFICE.

The work of the marine post office at Detroit during this season up to Nov. 1 is thus summarized by Joseph Maywurm, the assistant postmaster:

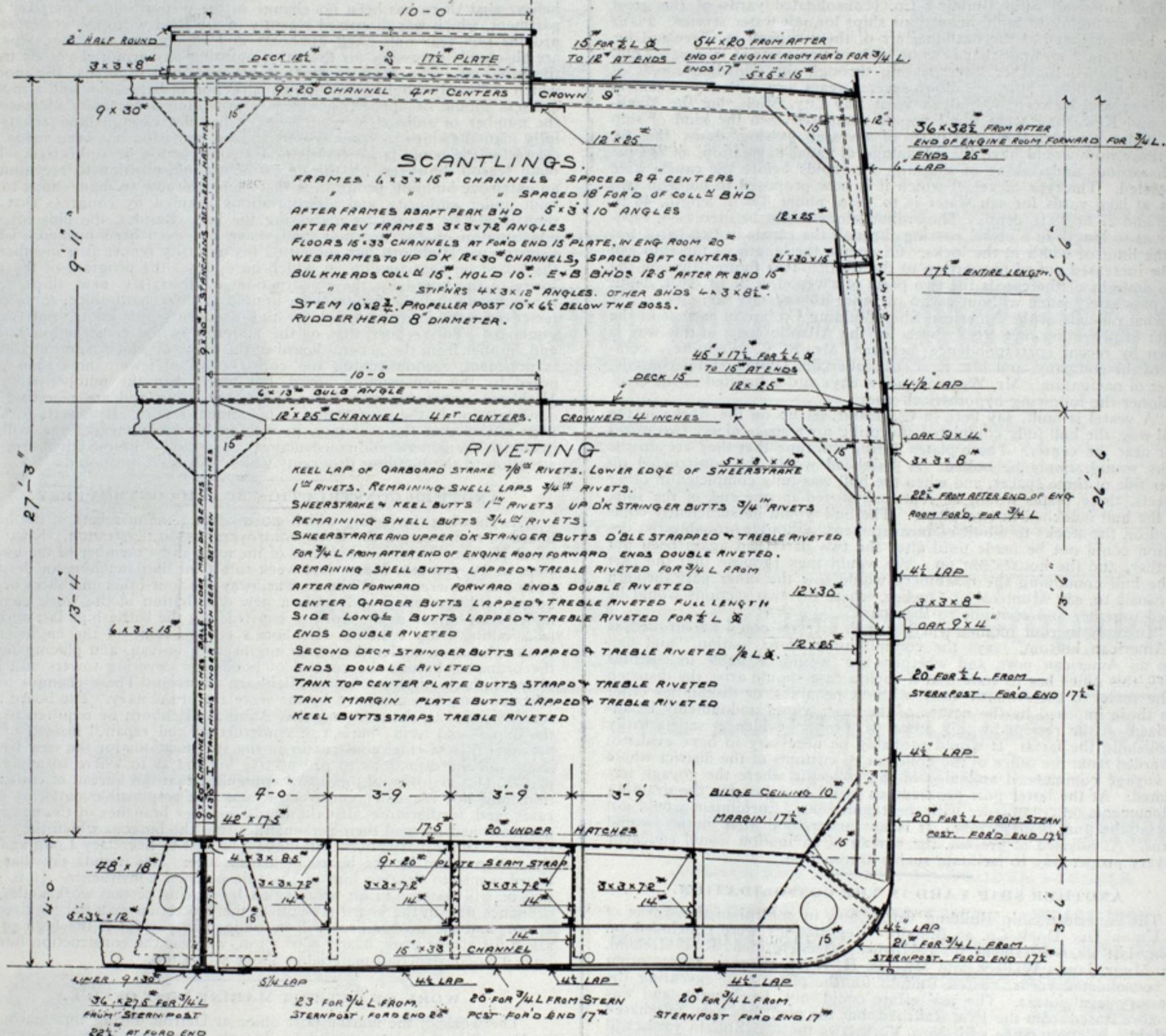
Number of vessel passages through river.....	19,717
Number of pieces of mail delivered to boats.....	224,984
Number of pieces of mail received from boats.....	81,700
Number of money orders sold to passing boats, 647, aggregating	

\$13,772.33.

M. A. Hanna & Co. of Cleveland have made arrangements with F. H. Clergue of Sault Ste. Marie water power fame to handle in the United States ore from the mines at Michipicoten, Ont., which were opened up during the past summer by Mr. Clergue in the name of the Algoma Iron Co. A cargo of 2,456 gross tons of the ore was delivered at Ashtabula, a few days ago, by the steamer Iroquois and will be smelted during the winter at some one of the furnaces in which M. A. Hanna & Co. are interested. It is thought that the ore which is said to be similar to the best hard ores mined by the Minnesota Iron Co. on the Vermilion range, will prove high enough in quality to warrant the payment of 40 cents a ton duty necessary to admit it to the United States, especially as the cost of mining is very low and the rail haul short at Michipicoten, with a water haul also considerably shorter than from the head of Lake Superior, as the mines are not far above Sault Ste. Marie on the Canadian north shore of the lake. Quite a large quantity of this ore has been shipped to a Canadian furnace plant on Georgian bay. It is said, however, that ore in the new district is not being found in the quantities at first anticipated.

SHIPS BUILDING AT CHICAGO FOR SALT WATER.

Plans for four steel steamers, all duplicates, building at the works of the Chicago Ship Building Co., are shown herewith. They are for the Northwestern Transportation Co., made up of New York, Chicago and Liverpool capitalists, whose first intention was to make a trial with them in through traffic between Chicago and Liverpool. It is understood now, however, that in view of profitable freights offered on the Atlantic seaboard of the United States the vessels will probably engage in trade along the coast upon completion early next spring. With a view to fitting them for a special charter that is offered on the seaboard, the hatches will be increased in size fore-and-aft and a turtleback built forward. Structural details are shown in the 'midship section. The vessels are of Canadian canal dimensions—256 ft. over all, 242 ft. between perpendiculars, 42 ft. beam and 26½ ft. depth. They will each be provided with triple expansion



'MIDSHIP SECTION OF FOUR SHIPS, DUPLICATES, BUILDING AT CHICAGO FOR SALT-WATER SERVICE.

engines of 20, 33 and 54 in. cylinder diameters and 40 in. stroke, with Scotch boilers, two each, of $12\frac{1}{2}$ ft. diameter and $11\frac{1}{2}$ ft. length.

These vessels were designed by Capt. F. D. Herriman, chief surveyor of the Great Lakes Register, Cleveland, and are being constructed under the supervision of that register. Other vessels building under supervision of the Great Lakes Register are: At the works of the Chicago Ship Building Co., two steel steamers of 6,000 gross tons capacity each for C. W. Elphicke and others of Chicago; at the Detroit Ship Building Co.'s works, a 5,000-ton steamer for D. C. Whitney of Detroit; at the Craig works, Toledo, a freight steamer of Canadian canal dimensions for Messrs. Hawgood of Cleveland, and a passenger steamer for the Booth Packing Co. of Chicago; also a large passenger steamer at the Collingwood Ship Building Co.'s works, Collingwood, Ont., and a freight steamer of Canadian canal dimensions at the works of the Jenks Ship Building Co., Port Huron, Mich.

The directors of the Trades League of Philadelphia have appointed a committee to confer with the New York Ship Building Co: relative to the construction of additional dry docks at Philadelphia. Recently, owing to lack of accommodations, two ships had to be sent away from Philadelphia to be drydocked, and the League thinks that the lack of accommodations is hurting the town.

TIDAL WAVE ON LAKE MICHIGAN.

ELABORATE REPORT FROM UNITED STATES WEATHER BUREAU, REGARDING
SEICHE OBSERVED NEAR CHICAGO IN AUGUST LAST.

By H. J. Coxe, Professor of Meteorology.

On Monday afternoon, August 20, 1900, a tidal wave, or seiche, occurred at the southern end of Lake Michigan. The phenomenon was quite marked at Chicago, where the water rose and fell several feet. Many persons were bathing in the lake at the time of the occurrence, about 5:15 p. m., but few persons can be found who made accurate measurements of the rise and fall of the waters. In some cases the extent of beach left by the receding waters was measured, in a few instances the distance be-

ing as much as 85 to 100 feet. But it is apparent that no adequate idea of the actual rise and fall can be gained from the observations, as on a very gradually sloping beach a change in water height of 1 ft. would leave bare a large surface, while such a change on a precipitous beach would be hardly noticeable. Again, there was a diversity of opinion as to the character of the wave itself. Many declared that the waters rushed out without a moment's warning and came back after the lapse of a few minutes with a rush and roar. Others held that there was considerable rise before the waters receded. This latter statement is undoubtedly correct. All agreed that the waters returned again to a point somewhat lower than that previously reached and again went out, but not so far as before. After this several rises and falls occurred, each less than its predecessor, until normal conditions were resumed. It is probable that there was only one actual tidal wave, and that subsequent changes were the natural result of the waters seeking equilibrium. As the waters receded a decided suction or undercurrent, extremely dangerous to those in bathing, was apparent. Two bathers were carried out and drowned, and a number of others narrowly escaped with their lives. The seiche was well defined at Windsor Park, a suburb of Chicago, in the southern part of the city, where there is an extended stretch of beach. At this place there is a bathing establishment managed by Mr. Nichols. In speaking of the phenomenon he said:

"I have been interested in this bathing resort for ten years. During

this time I have witnessed several occurrences similar to that of Tuesday afternoon, but none so marked. I was in bathing at the time. There is a platform standing in the water from which bathers are accustomed to dive. Under normal conditions the top of this structure stands 2 ft. above the water level. I did not observe that the water was rising until I saw that the top of the platform was not more than 1 ft. above water, so that I can not say just when the rise began, but it continued for fully ten minutes thereafter until the platform was only one or two inches out of the water. Then the fall began. While the water went out much faster than it came in, creating a perceptible current that came near carrying a swimmer out with it, there was no rush nor roar. As indicated by the stanchions of the platform the waters receded about 2 ft. below the normal level, representing an extreme fluctuation of 4 ft. between the highest and lowest points reached. After a lapse of 10 or 12 minutes the waters returned, but not to as high a stage as before. After this there were several rises and falls until normal conditions were resumed. The temperature of the water previous to and during the first rise, as shown by a thermometer near me, was 68°, but as soon as the waters returned after the first outflow the temperature of the water fell to 61°, a change of 7° within 10 minutes."

Capt. Henry H. Sinnigen of the Chicago life-saving station, located at the mouth of Chicago river, said: "Only one rise and fall of the water was noticed here. The river sunk about 4 ft. as the current rushed into the lake and then returned like a torrent, raising the water far above its level."

The wave naturally came with greater velocity and noise up the river

severe than the first and the water being carried farther out into the lake. While the seiche was in progress the water changed temperature three times, varying from 10° to 15°. Experts say that this was due to a change of the surface covering, the water at the bottom of the lake probably changing places with that at the top, owing to the central upheaval."

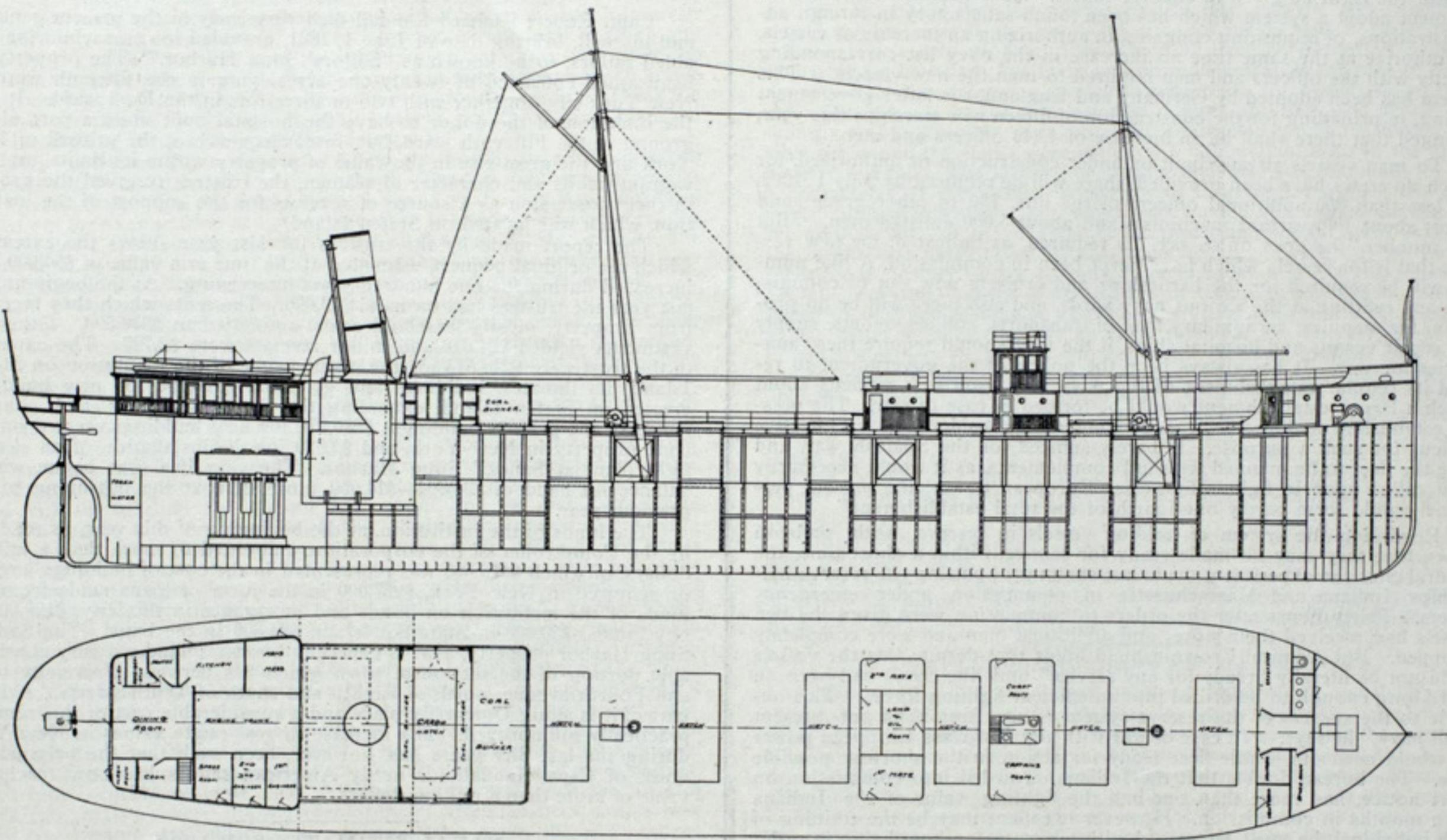
Sturgeon Bay, Wis.—"A heavy wind and rain squall from the northward passed over this region Monday noon, and it raged with all the fury of a cyclone. On the water it was accompanied by a small tidal wave, which for a short time raised the water in this bay fully 18 in. The wind suddenly whipped around to the northeast, and the moment this occurred the piled-up body of water caused a heavy current and undertow which had a velocity of from 5 to 6 miles an hour."

Racine, Wis.—"We observed here tidal waves more or less on August 19, 20, 24, 25, and 26; the water was on a continual rise and fall at the rate of 12 to 18 in., but there was no particular damage done."

St. Joseph, Mich.—"Monday, August 20, 1900, a tidal wave swept this shore of Lake Michigan at 5 p. m., rising from 1 to 2 ft."

Michigan City, Ind.—"There was a rise and fall of the water all day, the current in the river at times being very strong, the stage of the water varying at times from 2 to perhaps 4 ft. Just previous to the storm, which struck this point about 6:45 p. m., there was no perceptible tidal wave further than the unusual rise and fall of the water, which had continued for the greater part of the day."

Ludington, Mich.—"No unusual disturbance of lake level was noticed here during time of last Monday's reported tidal wave. Captain of life-saving station informs me that water rose and fell probably a foot during



GENERAL ARRANGEMENT AND DECK PLAN OF FOUR STEAMERS BUILDING AT CHICAGO FOR SALT-WATER SERVICE.

than along the shore of the lake. At the weather bureau station of Chicago a brisk southwest wind from 25 to 30 miles an hour prevailed during the entire afternoon preceding the waves. The wind shifted about 6 p. m. to a northeast squall for about 15 minutes, then afterwards to east and southeast, until about 8:10 p. m., when it veered to south and diminished in force. About 10 p. m. another squall from the northeast began, followed by heavy rain and thunderstorm which continued for about two hours. The barometer fell steadily during the afternoon until about the time of the wave when the pressure increased suddenly .05 of an inch. During the second squall which occurred late at night the barometer rose .15 in. in about an hour, and afterwards fell .12 in. in about the same length of time.

The day was marked by general and severe squalls on Lake Michigan; in the morning a tornado at Sheboygan, Wis., having occurred. Credible witnesses also report that a funnel-shaped cloud was observed in the lake off Windsor Park about 6 p. m.; and a waterspout was also seen near St. Joseph, Mich., about 4 p. m., which was described as being 25 to 30 ft. in diameter, and reaching from the surface far into the cloud. These conditions show that marked and rapid changes in the air pressure occurred on the lake, and together with the accompanying squalls, offer ready explanation for the occurrence of the seiches. It is probable that the phenomenon prevailed at different times over the greater portion of Lake Michigan, but the reports called for from weather bureau displaymen do not indicate that the wave was general. The following reports have been received:

Muskegon, Mich.—"Just before the windstorm swept over the city Monday afternoon, an interesting phenomenon was observed at the harbor entrance. Lake Michigan suddenly dropped 8 or 9 in. and then rushed back on the shore, the difference in depth during the manifestation being 18 in. There were a number of smaller similar waves."

South Haven, Mich.—"After the water had at first receded, it came rushing back 10 minutes later, deluging the shore. It is now agreed from reports that the two waves swept over the lake, the last one being more

wind squall; this is nothing unusual, however, during squally weather. The level was disturbed this much during last night's wind."

Captains of vessels coming into the port of Chicago stated that the lake was squally and acted in a peculiar manner all day, although the rise and fall of the water could not be noticed in mid lake. A tidal wave was also observed at St. Joseph, Mich., early in the morning of August 24 during the prevalence of a severe thunderstorm.

Ninetieth meridian time is used in this report.

THE HILL PACIFIC STEAMERS.

A correspondent asks for a description of the very large steamers for Pacific trade that are to be built at the new works of the Eastern Ship Building Co., New London, Conn., for James J. Hill of the Great Northern Railway. No complete description of these vessels has as yet been made public, but from notes regarding hull, machinery, etc., that have leaked out at different times from the office of the company in New London, it is learned the vessels are to be 625 ft. long and 73 ft. beam with a depth of 32½ ft., requiring for their construction about 20,000 tons of iron and steel. The displacement will be about 33,000 tons and the net tonnage (custom house measurement) 18,000 tons. It will readily be seen from these figures that the ships are to be very large. Their dead weight capacity is to be about 20,000 tons, and they are to have triple expansion engines of sufficient power to give them a speed of about 14 knots. Boilers are to be of the Niclausse water type, which are manufactured in this country by the Stirling Co. of Chicago. The number of boilers in each vessel will be about thirty-two. These are the kind of boilers that proved so successful in the Russian cruiser *Variag*, recently completed by the Cramps of Philadelphia. They are also being used extensively abroad, and with such great success that the British admiralty recently decided to install them in a few of their vessels, including a cruiser of 22,000 H.P.

A WORD OF WARNING.

IT IS CONTAINED IN REAR ADMIRAL CROWNINSHIELD'S ANNUAL REPORT—NOT ENOUGH OFFICERS FOR THE NAVY'S WORK.

"Having failed to provide enough officers to do the navy's work we are overworking those who are supplied. Many of these now in the service are being broken down under the strain. Through not having more officers, many of the best that we now have are being lost."

The warning words quoted above are contained in the annual report of the bureau of navigation, which its chief, Rear Admiral A. S. Crowninshield, has just submitted to the secretary of the navy. The admiral insists that some practical method of augmenting the navy's personnel must be authorized very soon or "the service will soon fall behind in its struggle—first, for leadership, and then for equality with other services." To Admiral Crowninshield the law authorizing the employment in active service of officers on the retired list is very objectionable, and he urges its repeal. It means, he says, "that those who are admittedly incapacitated for duty or entitled to further exemption from duty may be employed to bolster up a navy list staggering under a weight of duties entirely disproportionate to its numbers." To obtain the needed increase Admiral Crowninshield recommends that the course at the naval academy be reduced from six to four years, that appointments to the academy for the next ten years be double what they are now, and that to each United States senator the right be given to appoint cadets. He urges also that "the department adopt a system which has been found satisfactory in foreign administrations, of requesting congress, in authorizing an increase of vessels, to authorize at the same time an increase in the navy list corresponding exactly with the officers and men required to man the new vessels." This system has been adopted by Germany and England, the latter government having, in providing for the construction of fifteen new warships this year, arranged that there shall be an increase of 4,240 officers and men.

To man vessels already built or under construction or authorized, for which no crews have been provided, there will be required by July 1, 1902, not less than 300 additional officers of the line, 150 of other grades and corps, about 100 warrant machinists and about 5,000 enlisted men. "But this number," he goes on to say, "is required, as indicated, for new vessels; that is for vessels which have never been in commission. A like number will be required for the battleships and cruisers now out of commission and refitting at the various navy yards, and still there will be no provision for manning an auxiliary fleet of transports, colliers, scouts, supply and repair vessels and hospital ships, if the fleet should require these auxiliaries for war. It has always been the policy of the government to regard its regular establishment of the navy and army as a nucleus about which a larger establishment would be formed in case of war. The present establishment, however, can no longer be considered as an effective nucleus for such a purpose. It barely sufficed for the Spanish war, and were the fleet to be manned with full complements, as it would necessarily be if called upon to fight a first-class European power, the present personnel would form barely one-fourth of the total establishment."

Regarding the system of holding vessels in reserve, with skeleton crews, that they may be made ready for service within a short time, the admiral cites the experiment made last summer of putting the reserve battleships Indiana and Massachusetts in commission under emergency orders. Thirty hours after the orders to commission were given the two vessels had received their stores and additional men and were completely equipped. But Admiral Crowninshield holds that despite this the vessels could not be literally "ready for any service" until the crews had been on board long enough to be drilled into an efficient fighting force. "This obstacle to the success of the reserve system is very serious in our present small navy," he says. "In case of war with any first-class European power we would need our whole fleet ready for action in the shortest possible time. The bureau doubts that the Indiana, crowded into commission on short notice, had more than one-half the fighting value of the Indiana three months in commission. However excellent may be the training of each individual, he must be trained with his mates on board ship in order to give his full value to the ship. For this reason the bureau does not look toward to any present increase in the reserve system. Were our navy larger in comparison with our needs, motives of economy might make it wise to lay up vessels in reserve. Under present conditions, however, only those should be laid up in reserve which would otherwise have to go entirely out of commission."

The system established by the bureau of navigation of enlisting full-grown men as landsmen has had gratifying results. Before this system was put in operation the navy department found considerable difficulty in securing enough men for the service. A squadron of training vessels has been put in commission and six months' instruction suffices in a majority of cases to train landsmen in the ways of Jack Tar.

"These vessels," says Admiral Crowninshield, "have carried in all about 2,800 landsmen under instruction, and are furnishing for cruising vessels each six months about 100 trained men, who, when they first went on board, were landsmen without experience. Two thousand landsmen will have been trained and then turned into the service as ordinary seamen during the year ending Dec. 31, 1900. It is now seen that had not this system been established by the bureau it would have been impossible to supply this number of men in any other way. In other words, the navy would be short today 2,000 of its present complement, which means that the Kearsarge, Kentucky, Brooklyn, Oregon and Alabama would not now be in commission unless at the expense of an equal or greater number of vessels quite as necessary for maintaining our position in the Philippines, in China and elsewhere. We are still short of the total complement allowed, and still short of the number necessary to properly man the vessels needed in our fleets. We must, therefore, look during the next year to a further extension of the system for training landsmen; and since, as pointed out in last year's reports, the receiving ships, besides being utterly unsuitable, no longer afford sufficient accommodations, barracks must be constructed at once. The bureau, therefore, again urges that the department request congress to authorize an expenditure of \$600,000 for seamen's quarters at New York and League Island, \$100,000 to be made immediately available for work this year."

It is shown by the report that 57.3 per cent. of the petty officers in the navy are native born, 33.6 per cent. naturalized, 6.5 per cent. have declared

intention, and that only .9 per cent. are non-resident aliens. Of the men 64 per cent. are native born and 33 per cent. are citizens, and 93 per cent. of the apprentices are native born. Ninety-three per cent. of the whole number of landsmen enlisted for training are native born.

In his review of the work of the Asiatic fleet Admiral Crowninshield, referring to the monitors Monadnock and Monterey, says frankly that "these vessels are of little use in the present state of the insurrection, but are needed in the Philippines as a reserve for strengthening the fleet in case of threat or attack from another power." Speaking of the North Atlantic Squadron, he says: "It is much to be regretted that the drills planned for this squadron are compelled to be often interrupted by attendance of the vessels at local celebrations. These interferences invariably tend to demoralize the efficiency of the personnel."

In concluding his report Admiral Crowninshield refers to the refusal of congress to reward naval officers for their services in the war with Spain. He says: "Most of those who failed to secure such recognition owe the loss to the unfortunate public controversy which followed upon the president's recommendation that certain officers should be promoted. It is needless to say that the navy had no part in this controversy." Admiral Crowninshield makes no recommendation on the subject, but merely places the bureau on record "as again inviting the department's attention to the discouraging condition in which distinguished officers of the navy have been left by not receiving any form of recognition for their services during the war with Spain."

SAILORS' SNUG HARBOR PROPERTY.

Capt. Robert Richard Randall died very early in the present century, and his will, bearing date of June 1, 1801, provided for an asylum for disabled sailors, to be known as "Sailors' Snug Harbor." The property he bequeathed consisted of twenty-one acres lying in the fifteenth ward of New York city, together with two or three lots in the First ward. It was the intention of the donor to have the hospital built upon a part of the ground in the Fifteenth ward, but, in consequence of the growth of New York and the great rise in the value of property within its limits, and the vagrant habits and character of seamen, the trustees reserved the ground in their possession as a source of revenue for the support of the institution, which was located on Staten Island.

The report made by the trustees for last year shows the extent to which the original bequest, estimated at the time at a value of \$50,000, has increased during the one hundred years intervening. At the beginning of last year the trustees had on hand \$20,000. The rents which they received from property, mostly leasehold rents, amounted to \$350,503. Other investments yielded \$24,616 and minor receipts were \$2,727. The expenses of the trust were \$248,545 for the maintenance of the institution on Staten Island, its inmates, buildings and grounds; \$120,490 for new buildings erected on Staten Island, extending the accommodations and conveniences of the present buildings; \$220,278 for new buildings erected on the trust property in New York, and \$2,620 for the installation of an electric light plant at Sailors' Snug Harbor. The year 1900 was begun with a balance on hand of \$34,304—\$14,000 more than at the beginning of the previous year.

The funds of the institution, at the beginning of this year, as set forth by the Comptroller of the corporation, amounted to more than a million dollars, of which \$616,500 was represented in the cost of buildings, erected or acquired in New York, \$297,000 in the form of loans made from the funds of the institution on bonds and mortgages in this city, \$125,000 in city bonds, \$50,000 in State bonds and \$34,300 in the bank. The Sailors' Snug Harbor property, as it is generally known, includes a very considerable portion of the section of town which lies between University place and Fourth avenue, north of Eighth and south of Tenth streets. A large part of it is along University place and a considerable part of this remains practically unimproved. The increase in real estate values in New York during the last fifty years has, however, been such that the original bequest of Capt. Randall for needy American sailors has now reached a value of more than a million dollars.

NAVAL ESTIMATES FOR 1902.

The comparative statement of estimates and appropriations for the navy for the fiscal years of 1901 and 1902 shows that the total appropriations for the year 1901 were \$65,130,916, and the total estimates for 1902 are \$87,172,631. The principal items in the estimates for 1902 are as follows: Pay of the navy, \$15,125,684; bureau of ordnance, \$2,601,456; bureau of equipment, \$4,464,802; public works, yards and docks, \$12,302,540; public works at naval academy, \$3,000,000; supplies and accounts, \$4,843,849; construction and repairs, \$8,070,824; steam engineering, \$3,772,900; marine corps, \$2,918,520; increase of the navy, \$21,772,917; armor and armament fund, \$4,000,000; equipment, \$400,000; emergency, \$500,000.

Among the new items estimated for are: Outfits on first enlistments, \$90,000; chapel and reading room at Newport training station, \$28,750; arms and equipment for marine corps, \$100,000; new naval magazine near Boston, \$500,000; saw mill at Boston navy yard, \$100,000; torpedo boat storage plant at New London, Conn., \$100,000; barracks at New York navy yard, \$100,000; barracks at League Island navy yard, \$100,000; torpedo boat storage plant at the same yard, \$100,000; traveling cranes at New York and Norfolk navy yards, \$140,000 each; steam engineering plant, League Island navy yard, \$230,000; marine barracks at Annapolis, \$75,000; marine offices, headquarters, Washington, D. C., \$50,000; purchase of land at Norfolk navy yard, \$250,000, and torpedo boat storage plant at same place, \$100,000; quay wall at Key West naval station, \$100,000; purchase of land at naval station, San Juan, Porto Rico, \$450,000; torpedo boat storage plant at Pensacola navy yard, \$100,000; coal storage plant at naval station, Algiers, La., \$150,000; deep water basin at the Mare Island navy yard, \$130,000, and torpedo storage plant at same place, \$100,000; torpedo storage plant at Puget Sound naval station, \$100,000; works at naval station, Hawaii, \$127,300; works at Cabras Island, Guam, \$35,000; coal storage plant, etc., at naval station, Tutuila, \$225,000.

Lieut. Gov. James D. Dewell and others of New Haven, Conn., are arranging for the construction of a five-masted schooner of the type of the Gov. Ames. It was announced that the Holmes Ship Building Co., West Mystic, Conn., had received the contract, but the announcement was premature.

PROPELLER SHAFTS.

THE FREQUENT BREAKAGES AT SEA INTERESTS THE INSTITUTE OF MARINE ENGINEERS—VARIOUS REMEDIES ARE SUGGESTED.

The subject of propeller shafts now being a vital one, it might be well to review a discussion which has lately taken place at the meeting of the Institute of Marine Engineers at London. The discussion had to do with two papers which had been previously submitted by Mr. Edward Nicholl and Mr. G. F. Mason. Mr. George W. Manuel, past president of the Institute, occupied the chair and opened the discussion. He said that a goodly number of papers had been written on this matter and he regretted to hear that after all propeller shafts still break, and even a little faster than formerly, in spite of all that has been said and done to prevent such accidents. He held that the attempts at prevention have been very meagre. He could not understand why there should be such a record of broken shafts as had occurred lately and thought that in the interest of marine engineering the fullest information should be set forth regarding the probable causes. He believed that they were preventible. The discussion had to do entirely with cargo carriers.

GALVANIC ACTION SUGGESTED.

Mr. James Adamson, the secretary, then read a paper that had been received from Mr. J. McMillan, an engineer engaged on the Australian coast, who wrote:

"The subject of the relationship between a leaky dynamo and the active corrosion of a propeller shaft is one which has to me much interest. Is there any such relationship? If so, to what extent; and is there any remedy? You will possibly pass the subject over, as others have done, by saying that tail shafts corroded before ever electricity entered as an active agent on board ship. What first drew my attention to the subject was the steamer *Perthshire* breaking her shaft, others following, and then the *Fazilka* coming to grief through the same cause."

His experience was as follows: About six months after he joined the steamer she went into dock for an overhaul. The tail shaft was drawn out for examination. The shaft had been in for 12 years, and had only been taken out for examination at stated intervals. It was found to be corroded a good deal. The surveyor ordered that at the end of six months the spare shaft must be put in. At the end of that time the spare shaft was put in, the old shaft having corroded considerably during the interval. At the end of two years the propeller shaft was again drawn out for examination, when it was found to be in as bad order as the old one, and no spare shaft being available, the same one had to be put back again till another one was got ready. The engineer surveyor cut into the shaft three-eighths of an inch on each side of the diameter, close to the forward end of the after liner, and then was not at the bottom of the score in the shaft. The part cut into was filled up with red lead, putty and marline for about six inches on the length of the shaft. A new tail shaft was afterwards fitted, and on examination No. 2 shaft was found in a worse condition than No. 1 had been. Being curious to see if any action had taken place where covered with the marline, the lapping was cut off, and the metal was found to be as bright as when cut with chisels. Naturally, broken shafts being freely spoken about, he considered what could be the cause of our shafts corroding so fast, and it suddenly dawned on him that there might be something in the dynamo causing the action. He then remembered that there was a leak from the dynamo, as he could get a spark from any part of the hull if he connected a wire between the two. He also remembered that when the original engine was removed and the substitution made of an engine driven by belt, that the dynamo was bolted direct to the ship's frames, although sitting on a wooden block, and to all intents looked as if it was fixed in the proper manner. The dynamo is still fixed in that way if not altered since. He was at a loss to explain how the action takes place, yet he believed that it did exist. There are two ways that appeared to him. The first is to suppose the ship's hull to be a huge field magnet, stern tube included, and the shaft working as an armature, if the lines of force (magnetism) were slight under ordinary circumstances, and a leak from the dynamo was added to it, might not that cause the extra corrosion? The second is that the stern tube is a battery, and the leakage from the dynamo excites the water held in the stern tube in a greater or less degree, causing the action. If his contention be correct, that the relationship does exist, how is it to be remedied? This is the point at which he must give up. The subject seems worthy of discussion, and perhaps some engineers may be able to trace and explain the cause and effect, and perhaps lead to some experiments being made to test the cause.

THREE PROPOSALS ARE SUBMITTED.

Mr. W. Lawrie, in resuming the discussion, said that in closing his paper Mr. Nicholl asked for the approval by this Institute of three proposals—linerless tail shafts, shafts of larger diameter, and shafts made of better material than questionable scrap iron. But the author appeared to be somewhat premature in asking for shafts of larger diameter until he had decided what material he proposed to adopt in lieu of the material at present used. If they could find a material much stronger and much more suitable for the work than that now employed there would seem to be very little need for increasing the size of the shafts. He (Mr. Lawrie) agreed with the chairman that the breakages which now occurred so frequently were preventible, because in the experience of lines such as that the chairman was connected with they were practically unknown. Good scrap iron was a material that had served very well for shafts in time past, but it would seem that good scrap iron was not now to be had. Mr. Nicholl in his paper said: "Shafts made of the best scrap iron are generally stipulated for now, but this seems to be a very vague term, as often, and especially in our local yards, scrap steel is sold and bought and treated like scrap iron, and I should say a shaft made up of a mixture of scrap steel and iron would be the most unreliable thing you could possibly have." When Mr. Nicholl spoke of "our local yards" he presumably referred to yards in the neighborhood of Cardiff, but if the same practice obtained elsewhere he (Mr. Lawrie) did not see that it was much use looking for good scrap iron. At any rate, he thought they would all be agreed that as time went on it would become increasingly difficult to procure good scrap iron. They should therefore look ahead and see what better material could be found, and experience almost forced them in the direction of nickel steel. Mr. Nicholl inclined towards nickel steel, although

he did not advocate it very strongly, and unfortunately no information was given in the paper as to whether nickel steel had been tried for propeller shafts, and, if so, with what success. His (Mr. Lawrie's) view was that shafts of nickel steel ought to have a fair trial. Instead of increasing the size of shafts they should seek to improve the quality of the material, and if they had a good material they might well keep the sizes within reasonable limits. In the second paper under discussion Mr. Mason took up a somewhat different view to that put forward by Mr. Nicholl, and appeared to trace all the trouble to the advent of the triple-expansion engine. Four crank or quadruple engines, said the author, simply added to the difficulty. The special points to which Mr. Mason called attention were all fairly well attended to in any well regulated company, but there was one that was not, and that was the plan of running in oil, which in his (Mr. Lawrie's) opinion would materially assist the satisfactory running of propeller shafts.

The chairman referred to certain tests which he had carried out with nickel steel for the purpose of ascertaining the superiority or otherwise of that metal for propeller shafts, and said the conclusion he came to was that, having regard to its higher cost, nickel steel was not preferable to the good mild steel which had given such satisfactory results. He had been using this particular mild steel since 1881, and from that date up to the present time he had not had a single case of a broken shaft. The result of his tests was that nickel steel was stronger than the best mild steel, but very little stronger. The Germans and Russians are now using nickel steel. Mr. Lawrie questioned whether in the class of steamers referred to in the paper it would not be worth while incurring the additional expense involved in the use of nickel steel?

Mr. Sage said that the point raised by Mr. Lawrie was whether it would not be better to pay the extra price for nickel steel in order to get a better article, and probably they would all have no hesitation in saying that it would be better, but there was no inducement in the case of steamers in which these failures occurred so repeatedly, for owners to go to the extra expense. It was all a question of pounds, shillings, and pence. Ordinarily tramp steamers were generally contracted for at the lowest possible price, and the shafts were made on a commercial basis in the cheapest way possible. The method of forging the shaft was frequently of such a character that the virtues of steel were largely destroyed. The ship-owner ultimately got his ship, which was classed at Lloyd's, and the vessel went to sea. If the steamer broke down and was brought into port the owner was indemnified by the underwriters. There was no inducement for the owner to pay a penny more in order to get a good material. Of late years the owners of large lines of tramp steamers had been induced to start self-insurance, and then there was no doubt an inducement to use better material and pay an extra price for it. The very light trim in which steamers were often sent across the Atlantic, and the hammering and battering to which their shafts were subjected in consequence, was, he believed, responsible for a great number of the failures which occurred, and he referred to a case within his own experience in which a shaft at least 30 per cent. in excess of Lloyd's requirements broke off short before it was two years old. His theory was that the constant vibration and concussion deteriorated the quality of the metal, and an increase in the diameter of the shaft might prolong its life, but it would not prevent the ultimate fracture.

Mr. Hawthorn suggested that in considering the causes of the trouble with propeller shafts sufficient notice had not been taken of the wear down of the tail end of the shaft in the stern tube. It might also be instructive to compare the number of fractures under present conditions with those that occurred when they had outer bearings in the rudder post.

ADMIRAL BRADFORD'S ANNUAL REPORT.

The report of Rear Admiral Bradford, chief of the naval bureau of equipment, made public this week, records unprecedentedly large expenditures by cruising ships during the last fiscal year, and the disbursement of large amounts for freight involved in the transportation of stores. Admiral Bradford sets forth the desirability of a naval station at Guam, emphasizing the importance of the island as a naval base. He also recounts rapid improvements in equipment work at the Cavite naval station, and the completion of a steel cold storage house at Pago Pago, on the island of Tutuila, Samoa. The new floating dry dock for the naval station at Algiers, La., is to be completed by May, 1901. The amount of coal being consumed by the navy is increasing year by year, and its cost averaged nearly \$2 a ton more than during the fiscal year of 1898. Admiral Bradford again renews his recommendations for new naval coal depots.

The bureau recommends the installation of the Marconi system of wireless telegraphy on board of several ships of the navy, provided it can be done at a reasonable cost. Experiments in this system of signaling have proved successful in the main in the trials made by ships of the North Atlantic squadron. The report says that the survey by the United States steamer *Nero* for a trans-Pacific submarine telegraph cable between Honolulu and the Philippine Islands was most successfully accomplished, and that a satisfactory route for an all-American cable to connect the Pacific Coast with the outlying colonial possessions of the United States in the Pacific, and with China and Japan, has been discovered, thoroughly explored, surveyed and mapped. The bureau is now ready to lay the cable at any time. Attention is called to the necessity for a survey of the western Pacific ocean. Many reported "dangerous" spots appear on the charts whose absolute danger is doubtful, thus giving rise to a great deal of uneasiness among navigators.

LAUNCH OF JAPANESE BATTLESHIP MIKASA.

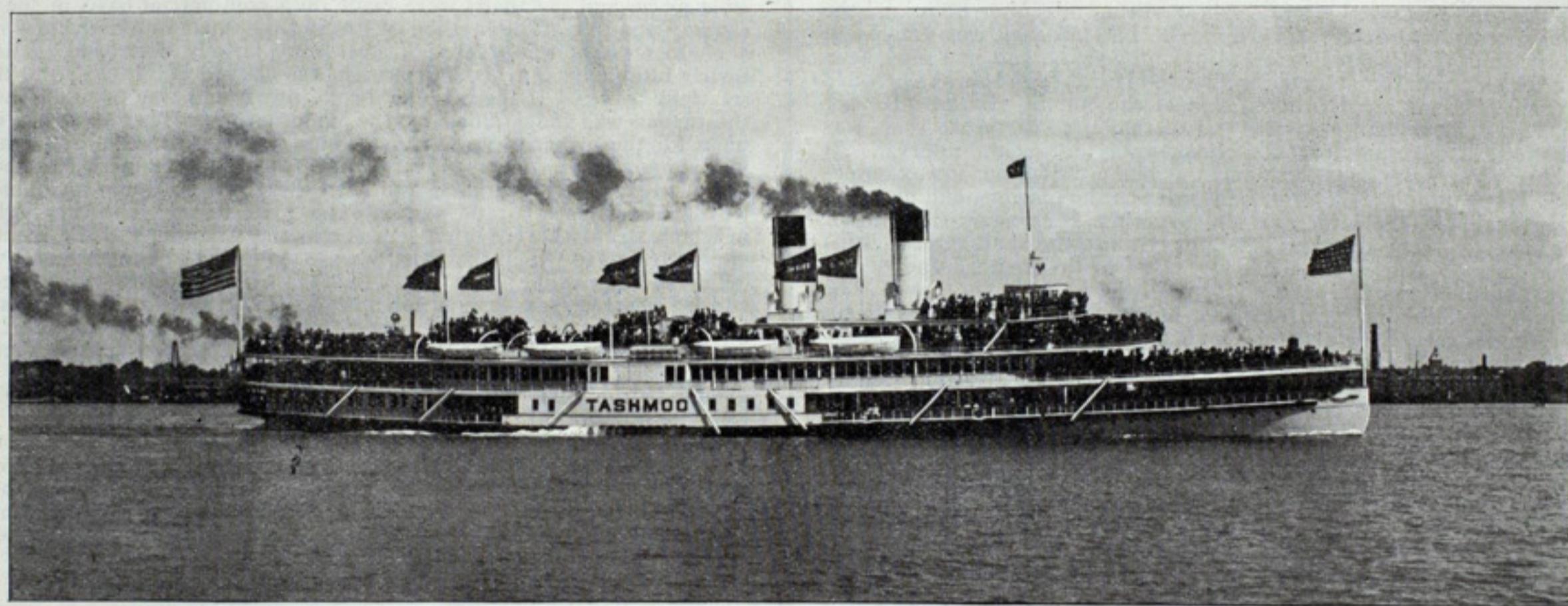
The Japanese battleship *Mikasa*, one of the most formidable vessels of its kind in the world, was launched last week at the Vickers-Maxim works at Barrow. The *Mikasa* is of 15,200 tons displacement. She is 400 ft. long, 76 ft. wide and 27 ft. 3 in. deep. She has two propellers, and has an armor belt of 12 to 4 in., and the armor on her gun positions is 14 to 6 in. thick, while the deck plating is 2 in. thick. The armament of the *Mikasa* consists of four 12-in. guns, fourteen 6-in. quick-firing guns, twenty 12-pounders, eight 3-pounders, and four 2½-pounders. She has four submerged torpedo tubes. The battleship has a speed (estimated) of 18 knots, and her normal coal supply is 1,400 tons. She carries a crew of 730 men.

Capt. Warren Sawyer of Millbridge, Me., is to build a four-masted schooner for Boston parties.

COMPETITION FOR POLLACK LIFE-SAVING PRIZE.

It will be remembered that the heirs in this country of Anthony Pollack, one of the victims of the Burgogne disaster, offered a prize of \$20,000 for a device which would seem to remove, or at least minimize, any danger of loss of life at sea. The various devices offered in competition had to be presented at the Paris exposition. The collection is described by the Engineer of London. They have been grouped together on the bank of the Seine, underneath the navigation palace. There are scores of inventions from England, America, Australia, Scandinavia, Germany, France and Switzerland. Taking, first of all, the various devices for lowering boats from ships' sides, we find the Ranking patent boat disengaging gear, which consists essentially of two horizontal girders hinged together at the center, and fixed by a clutch, from which descends a chain, engaging in a hook at the bottom of the boat. Two other chains hang from each end of the girder by means of swivels, which are merely held in position by the curved ends of the girders. To disengage the boat the hook at the bottom is drawn back by a rope. The weight being thus released from the clutch, the two girders fall and the swivels slip off the ends, thus leaving the boat free. F. Hiorth of Christiana, Norway, shows models and drawings of a device in which there are very long davits hinged to the ship's side at about the water level and curving up over the upper deck. These davits fall outwards by their own weight when released by a winding gear, and deposit the boat in the water. The davits are connected by netting to receive people who jump overboard, so that they can be easily gathered into the boat. The Kennedy lifeboat crane and detaching gear is formed of a straight davit terminating at its lower end in a toothed segment, so that any inclination can be given to it by a hand gear. When the boat is in the water the ropes are disengaged from clutches at each end by a lever. Another device for disengaging a boat is shown by Arthur W. Savage, of Utica, N. Y., whose system provides for the releasing of clutches at each end of the bar suspended from the davits above the boat. The automatic closing of water-tight doors is the subject of two patents. A door on Hind's system is shown by the Water-

strip, which normally folds up around the end of the boat, and when in service the fork is let down with a heavy weight attached. Eugene Ogez of Dunkerque has devised a davit formed of vertical columns, to the top of which are hinged horizontal girders. The boat is suspended from the girders by means of pulleys. Professor W. B. Goldberg of New York hopes to obviate any risk from collision by surrounding the vessel with india-rubber buffers of 12 in. diameter, each series of buffers being connected horizontally by three steel cables of 2 in. diameter. John McAdams & Sons of Brooklyn, N. Y., think that prevention is better than cure, and fit vessels with shields that normally fold up against the ship's side, but expand when the chain attachment is released. Capt. Holmes of Melbourne, Victoria, shows a new collision mat; and H. Mariolle has a model with india-rubber bags packed away around the outside of the ship containing calcium carbide, so that in the event of collision water can be admitted to generate gas, thus constituting a number of balloons, which will keep the vessel afloat. This is something similar to the Leva system. Life buoys of reindeer hair are shown by Frank H. Wilson of Bridgford, North Devon, and W. C. Möller of Drammen, Norway. There seems to be special virtues in reindeer hair for life saving. Some curious devices in the shape of metal cylinders with belt attachments are shown by Hamberger & Steltzer of Berne. On land the cylinder can be used as portmanteau, and umbrellas and canes can be stuck in the belt. One of these apparatus is exhibited with an umbrella attached, which arrangement must obviously be of considerable service in preventing the shipwrecked mariner from getting wet should it rain. Of life-saving belts there are any number, the most practical being the "Simplex" gear of H. Binko & Co. of 34 Leadenhall street, London, which is instantly dropped by means of a tripping hook operated either mechanically or electrically. A chemical light burns on the top of the buoy as soon as it comes in contact with the water. A French inventor has devised a lifebuoy of gigantic dimensions, fitted up with beds and accommodation for a ship's crew, together with provisions for a considerable time. He does not give any indication as to where this unwieldy contrivance is to



The Tashmoo on Dewey Day.

Copyright, 1900, by Detroit Photographic Co.

tight Door Co., Limited, Cable Works, Preston, and the features of this device are the diagonal hinges which cause the door to swing to and fall into notches by its own weight. It is raised out of the notches for opening by a lever. It has the advantage of great simplicity and certainty of action. In the Montgomery Moore's system the doors are controlled either by electricity or by hydraulic, pneumatic, and steam power. In the first case the door slides along between guides by means of a worm-shaft passing through a worm on the door. A rapid revolving motion is given to the shaft by a Lundell electric motor. In the other system a similar movement is given by two horizontal cylinders carrying pistons attached to the top and bottom of the door. The operation of opening and closing the doors is performed in the chart-house, so that in case of emergency all the doors are instantly closed by means of a controlling lever. This naturally entails a rather complicated system of electric wires, or air, steam, and water pipes. Another class of life-saving devices comprise uncapsizable boats, and decks forming rafts which will float in the event of the vessel sinking. Among these is the Fairplay lifeboat, which is built up in three sections, the two end ones in the shape of hollow watertight cylinders and cut away for the bow and stern. They are connected with the boat by swivels, and stability is given to the middle part by hollowing out the bottom in place of the keel and by building it with water tight compartment along the sides. The boat rests on deck, and the end parts being cylindrical allows of its being rolled off into the sea, but the boat itself always maintains a vertical position. In the smaller model the boats rest on metallic guides which incline overboard, but in the larger model the boat is hung from davits. Bolt's cabin is intended to float in the event of the ship sinking, and another similar device is an upper deck in the form of a raft with a number of compartments for provisions, etc. An unsinkable deck seat is also exhibited by Williams & Bates, 59 Shoe-lane, Holborn-circus, London. There are several examples of Roper's life-saving inventions, comprising broad-beamed, flat-bottomed boats with four or five keels, and hollow up to within 2 ft. or 3 ft. of the gunwale, an upper deck forming a raft and fixed on to a girder framework by means of levers, which on being released allow of the deck sliding down to the water, and also a new system of box girder davit of semicircular form with an arm half-way up running in a horizontal guide bolted to the deck. This davit is moved forward over the ship's side by a winding gear. N. H. Borgfeldt, 221 Rodney street, Brooklyn, N. Y., aims at rendering a boat unsinkable by fixing a steel belt around outside amidships. To this belt are hinged the two ends of a fork, also of steel

be carried. There are plenty of life-saving dresses, most of them consisting of rubber jackets or bladders that can be blown up, and others resemble a diver's dress, such as that exhibited by the Societe Probst and L. Philippon of Geneva, who shows pictures of how people look when wearing this dress in the water. It is almost worth while being shipwrecked in order to enjoy the luxury of assuming these unconventional attitudes. The dresses are lined inside with tablets of chocolate. The last invention that came under our notice was a cross between a battleship and a Trans-atlantic liner with the funnel astern, and carrying amidships a sailing vessel with sails all set. We did not see the name of the exhibitor. Perhaps he was too modest.

The committee who undertook the work of judging these inventions concluded that they were unable to award the full prize, though they suggested that a part of the prize might be given for Roper's life-saving devices. So far as can be gathered, the judges believe that nothing which has yet been introduced in the shape of life-saving dresses is at all practical, for the reason that during the panic which may be expected to take place at the moment of a catastrophe none of the passengers would be cool-headed enough to carry out the preparations necessary for using these dresses, even to the extent of blowing up bladders and belts. This was proved by an experiment which was carried out in the United States some time ago when belts were distributed to all the passengers, with careful instructions as to how to use them, and shortly afterwards, on an alarm being given, everyone rushed on deck without their belts. Nothing can be considered good enough for the Pollack prize unless it either renders the sinking of ships impossible or unless the life-saving devices should be automatic in action or can be instantly controlled by the captain. The judges were mostly impressed by the arrangements for automatically closing water-tight doors, by some of the systems of float decks, and by the devices for promptly and safely releasing lifeboats. As for the decks, there would seem a danger of their being swamped or overturned by the swirl of water above a sinking ship, but it will be noticed that Roper's invention guards against this by sliding off the deck so that it can get clear of the ship before she goes down. The judges have decided to recommend the heirs of the late Mr. Pollack to keep open the prize for another year, so that experiments with new inventions can be carried out on the Seine.

Four-masted schooner, building at Houghton's yard, Bath, Me., will be launched about Christmas.

BEGINNING OF THE MARINE HOSPITAL SERVICE.

The old hospital building on Castle island, Boston, has many historical associations, having been built by the British and used by them as a military hospital, and as a place of confinement or detention. In later days, when the old fort was in service, it was used by the United States troops garrisoned there. In the building was given the first relief furnished by the United States government to sick and disabled sailors. This important fact in connection with the old building and Castle island is a matter of official record, and appears in the report of the supervising surgeon general of the marine hospital service in an historical sketch of the beginning, growth and extent and the present establishment of the extensive marine hospital system. The sketch, compiled by Surgeon H. W. Austin, then in charge of the present hospital at Chelsea, from official records and research, was written as the result of the destruction of many of the records of the local department by the fire in State street block in 1896. On July 16, 1798, congress passed an act for the relief of sick and disabled American seamen, creating for this purpose "the marine hospital fund" by imposing a tax upon seamen of 20 cents a month. This is the same law and figure operative today. Medical relief, the official report says, was furnished to seamen first at Castle island in the port of Boston by Dr. Thomas Welsh of Boston. Dr. Welsh was a charter member of the Massachusetts medical society and its first treasurer. He held a contract from the secretary of war to attend sick soldiers at Castle island, and the secretary of the treasury, under whose direction the marine hospital service was placed from the first, also immediately employed him to care for any sick American seamen that might be sent to him by the local collector of customs, and at the same time arrangements and facilities were made to house and care for them at the hospital at Castle island, hospitals then being practically an unknown quantity in Boston.

Dr. Welsh's services were continued and sick seamen were treated at Castle island until the completion of the first regular marine hospital at Charlestown, in what is now a part of the navy yard.

This site was selected in 1802, and the building was finished and ready for occupancy in December, 1803. The hospital stood directly at the riverside, and had a wharf veranda on that side. The structure, enlarged and remodeled, and now some distance from the water, is still standing, being the familiar row of dwelling houses occupied by the senior officers of the navy yard, facing Chelsea street at the approach to Chelsea bridge. The old building was but two stories in height, and faced the other direction than does the present block, the old Mystic turnpike running along inside the present line of the navy yard. The building, as originally erected, was 100x40 ft., and contained nineteen large rooms, a large hall and a kitchen. It was surrounded by five acres of land, barns, etc.

The first patient was admitted Jan. 1, 1804. The hospital was equipped for the treatment of every kind of a complaint, and its inauguration marked the opening of the first general hospital and system in Massachusetts, or New England, in fact, the Massachusetts general hospital not receiving its charter until Feb. 25, 1811.

Dr. Charles Jarvis, a graduate of Harvard college and a charter member of Massachusetts medical society, was the first surgeon in charge, or medical director, as they were first called, of the marine hospital. He died four years later, and was succeeded by Dr. Benjamin Waterhouse, professor of theory and practice in physics at the Harvard college medical school and the first doctor to practice vaccination in America, first vaccinating his own son in 1800.

The records of the hospital prior to 1809, and those from 1836 to 1851, were burned in the fire at State street block. But the records from 1809 up to Jan. 1, 1820, are intact, and the most interesting of all. In this period 4,307 patients were treated for various diseases or operations, and there were 245 deaths.

The years 1812 and 1813, the period of the war of 1812, are of the greatest interest in the hospital's earlier history, the privilege of the marine hospital service having been extended to include the treatment of sailors and marines of the regular navy in 1799, and all were treated there up to the separation of the institutions in 1821.

Nearly all the patients of 1812 and 1813 were regular naval men, sailors and marines from the famous frigates Constitution, President, Congress and United States, the brigs Syren and Hornet and other United States vessels and privateers less known to fame. Among the patients, too, were the wounded from the British frigate Guerriere, sunk by Old Ironsides in their memorable conflict. In 1812 a total of 649 were treated at the hospital, and there were thirty-three deaths, while in 1813 496 men were cared for, of whom forty-three died. A glance through the complete list of deaths on one page, and including from Jan. 1, 1810, to Dec. 31, 1813, together with the birthplaces, would tend to show that the American navy of the war of 1812 was manned quite as largely by foreign-born sailors as it was a dozen or so years ago, when there was such a hubbub about foreigners in the service, and when was started the successful effort to attract more Americans to join. Massachusetts leads the states in the matter of natives, although many of the names given as born in Massachusetts, as well as in other states, are distinctively foreign. In the early 20s, when a large commerce was being carried on by American clipper built ships, which, sailing from Boston and Salem, dotted the ocean around the world with a procession of American flags, the facilities of the local hospital proved inadequate, and at New York and Philadelphia the same trouble was keenly felt.

As a relief, congress, in 1821, authorized the establishment of separate hospitals for the regular navy, under the direct charge of the navy department, and the next year gave the Boston hospital additional relief by authorizing the erection of a new and larger institution.

A site was secured in Chelsea, quite handy to the Winnisimmett ferry landing, the ground being ten acres in extent. A big, roomy granite hospital was erected and first occupied in 1827.

In the interval the navy department built the newly established naval hospital on its present historical site, the original building still being one of the main hospital buildings. The first marine hospital in Chelsea was not adjacent to the naval hospital, as now. The present marine hospital

was built in 1860 on land ceded by the navy department from the naval grounds for the purpose. The old hospital in Chelsea, which was occupied from 1827 to 1860, is still standing on Essex street. But slightly changed in external appearance, although, of course, entirely remodeled and rebuilt internally, it is now occupied as Shurtleff grammar school of the city of Chelsea.

LAUNCH OF MONITOR ARKANSAS.

The monitor Arkansas was launched at Newport News on Saturday. Miss Bobbie Newton Jones, daughter of Gov. Jones of Arkansas, christened the vessel. In addition to Gov. Jones of Arkansas, Gov. Tyler of Virginia was also present. The monitor Arkansas is the first of a type developed by the American navy, for not since the days of the civil war has a single-turreted monitor been constructed. The Arkansas will have as sister ships the Florida and the Wyoming, and a third, which was to have been the Connecticut, still unnamed. These are known as harbor-defense monitors, and while small, will have large accommodations for crews for vessels of their size, and so be valuable for the use and instruction of the naval militia. The Arkansas is to cost not more than \$1,500,000 complete. The designs were prepared by Chief Constructor Hichborn, and provide for a single-balanced turret of the Hichborn type, on the center line forward, with an inclined top, and made of steel nine inches thick. This turret will contain two of the new high-power 12-in. breech-loading rifles. Besides this armament, the Arkansas will carry four 4-in. rapid-fire guns, three 6-pounders, and four 1-pounders. A special effort was made to secure light draught for this formidable type of vessel, so the Arkansas, when complete, will draw only 12 ft. 6 in. of water, on a displacement of 3,235 tons, enabling her to slip into any harbor open to sea-going shipping. Eleven inches of steel armor protect the sides of the monitor above the water line, and there will be a protective deck for the full length of the vessel 1½ in. thick. Twin-screw engines will drive the monitor, at a maximum speed of 11½ knots, amply sufficient for a harbor-defense vessel, and electricity will be employed for turret turning gear, ammunition hoist, ventilating apparatus, and all the secondary machinery. All the wood in the vessel is fire proof. Unlike the old type of monitors, the Arkansas will have staterooms above deck for the officers and crew, but the superstructure has been so designed that it will not affect the ship, should the superstructure be destroyed in action, thus retaining the virtue of the monitor principle.

LIGHTS ON FISHING VESSELS—THE BRITISH PROPOSITION.

The American delegates to the International Marine Conference, Rear Admiral S. R. Franklin, U. S. N., Captain John W. Shackford, the Hon. W. W. Goodrich, Mr. Clement A. Griscom, the Hon. S. I. Kimball, met at the bureau of navigation last Thursday to consider the proposition to modify in several particulars the rules for preventing collisions at sea in so far as they relate to lights on fishing vessels. The changes relate particularly to trawlers on the North Sea. In so far as they relate to American fishing vessels the changes proposed are in accord with the views of those most directly interested. After some discussion the delegates determined to ask congress to adopt the proposition which originates with Great Britain. The enforcement of these rules, if adopted by congress, will be conditional upon their adoption by the other maritime powers, as the intention is to secure uniformity in the rules to prevent collisions at sea.

The American rule for lights on steam pilot vessels is also to be made the international rule.

Following is the text of the British proposition:

Art. 9—Fishing vessels and fishing boats, when under way and when not required by this article to carry or show the lights therein named, shall carry or show the lights prescribed for vessels of their tonnage under way.

(a) Open boats, by which is to be understood boats which have no covered sleeping accommodation for the crew, shall be required to show one all-round white light when engaged in any fishing by night.

(b) Vessels and boats other than open boats, when fishing with drift nets, shall carry two white lights where they can best be seen. Such lights shall be placed so that the vertical distance between them shall be not less than six feet and not more than 15 feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than 5 feet and not more than 10 feet. The lower of these two lights shall be towards that end of the vessel to which the nets are attached, and both of them shall be of such a character as to show all round the horizon, and to be visible at a distance of not less than three miles.

(c) Vessels and boats other than open boats, when line-fishing with their lines out and attached to their lines, and when not at anchor or stationary, shall carry the same lights as vessels fishing with drift-nets. When shooting or towing their lines, they shall carry the lights prescribed for a steam or sailing vessel under way respectively, and in addition may show a white all-round light, not more than 4 feet from the deck.

(d) Vessels, when engaged in trawling, by which is meant the dragging of an apparatus along the bottom of the sea—

1. If steam vessels, shall carry in the same position as the white light mentioned in Article 2 (a), a tri-colored lantern so constructed and fixed as to show a white light from right ahead to two points on each bow, and a green light and a red light over an arc of the horizon from two points on either bow to two points abaft the beam on the starboard and port sides respectively; and not less than 6 nor more than 12 ft. below the tri-colored lantern a white light in a lantern, so constructed as to show a clear, uniform and unbroken light all round the horizon.

2. If sailing vessels, shall carry a white light in a lantern, so constructed as to show a clear, uniform and unbroken light all round the horizon, and shall also be provided with a sufficient supply of red and green pyrotechnic lights, which shall each burn for at least thirty seconds, and shall be shown according to the tack on which the vessel is trawling (red port and green starboard tacks) on the approach of or to other vessels in sufficient time to prevent collision.

Work upon the new steamer for the Maine Steamship Co. has been started at Roach's ship yard, Chester, Pa. The contract for the steel plates has been given to the Tidewater Steel Co.

MARINE REVIEW

Devoted to the Merchant Marine, the Navy, Ship Building, and Kindred Interests.

Published every Thursday at No. 418-19 Perry-Payne building, Cleveland, Ohio, by THE MARINE REVIEW PUBLISHING CO.

SUBSCRIPTION—\$3.00 per year in advance; foreign, including postage, \$4.50, or 19 shillings. Single copies 10 cents each. Convenient binders sent, post paid, \$1.00. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

Science has again routed tradition. In this case it is the time honored and accepted belief that coal for sea carriage should not be shipped in wet condition. It has been held for years that damp coal is more likely to develop spontaneous combustion than dry coal, and so thoroughly grounded was this belief that the board of trade inspectors, entrusted with the investigation of fire on coal ships, have always inquired about the weather during the transit of the coal from the pit into the ship's hold. The question has not troubled the American shipper much, since he has rarely had to ship coal a sufficient distance to permit the lapse of time requisite for the generation of spontaneous combustion. However, the shipment of American coal to the European market in sailing ships is by no means an impossibility and the question is germane. The case in point has to do with a fire which occurred on the coal laden ship Walter H. Wilson, and Prof. Threlfall was commissioned to inquire into the probable cause. He shows pretty conclusively that wet coal is not the dangerous cargo it has been considered. The Walter H. Wilson, a four masted sailer of 2,461 tons net, loaded on Aug. 24, 1899, some 200 tons of coal, and from Sept. 1 to Sept. 5 she took in more coal, making in all 857 tons. Of this total it was estimated that 100 tons was wetted. In addition to coal the ship carried 2,120 tons of coke, 480 tons of brick, thirteen tons of fireclay, ten tons of iron, fifty cases of dynamite, and one case of detonators. The coal was carried in No. 3 hold—hold between the main and mizzen masts—boards being placed on top of the coal and the hold filled up with coke. After being out twenty-six days a smell of sulphur was observed, but this passed away and no further cause of alarm occurred until ten days later when smoke of a pale blue color was observed proceeding from the hatchways. Three days later the mizzen mast was found to be hot and the dynamite and detonators were thrown overboard. The vessel took refuge at Bahia, where the fire was temporarily subdued, but broke out again, so that two months were occupied in discharging and the vessel was seriously damaged. It will be seen that there is nothing to differentiate the firing of the cargo of the Walter H. Wilson from other instances of spontaneous combustion among coal cargoes. The board of trade submitted a number of inquiries to experts entrusted with the case. From a learned disquisition on the subject of pyrites in coal it was demonstrated that no single instance of spontaneous combustion had ever been shown to be due to this cause either on land or sea. On the action of moisture in facilitating spontaneous combustion Prof. Threlfall was equally explicit. He said: "It is the almost universal opinion among coal shippers and seamen that wet coal is more likely to fire than dry coal. I shall, however, show that this is the exact opposite of the truth and is the result of want of chemical knowledge and of believing what 'one was told when one was young.'" He proves that water reduces the initial temperature of the coal and so retards any heating process, and secondly, that if the coal does heat, a great portion of this heat will be absorbed in evaporating the water or moisture occurring among the coal. The conclusive part of his argument lies in the fact that two cubical bins, each holding 245½ tons, were loaded with dry small coal. In one bin the coal was drenched with a hose as it was shoveled into the bin. In sixty days the dry coal reached a temperature of 200 degrees C., and was on the point of firing, while the moist coal in the other bin had reached a temperature of only 35 degrees C. The lesson is obvious.

The Boston Herald, the Philadelphia Ledger and the Nation are arrayed against an increase in the navy of the United States. These journals represent that it is time to call a halt in the acquiring of warships and point to the rapid growth of the navy since the work of modernizing it began in 1883. These journals insist that during the period from 1866 to 1885—the era of the small navy—the United States did not suffer. The thirty or forty wooden vessels left over from the civil war were quite sufficient to safeguard the sea, to protect American interests in China and elsewhere, to destroy derelicts and to map the coast and sea bottoms. Very good, indeed; but these wooden cruisers would have made a sorry showing off Santiago. Continuing the discussion, the Nation says:

"From 1884 to 1900 there were added to the navy list seven battleships and forty-five monitors, cruisers and gunboats as well as nineteen torpedo boats. Furthermore the war with Spain led to the retention and purchase of about thirty vessels which were converted into cruisers and gunboats, and sixty or more colliers, supply ships and tugs, while twenty-four more warships of all sizes, from the Reina Mercedes of 3,090 tons to the little Sandoval of 100 tons, were captured or purchased from Spain. In addition

to this great increase there are at the present day under construction or authorized by congress eleven battleships, six armored cruisers, nine protected cruisers, four monitors and thirty-eight torpedo boats and destroyers. To the average citizen who has the fear of foreign invasion at heart, it might well seem that this force would suffice to prevent European navies from capturing our towns."

If it were only the fear of foreign invasion that disturbed his soul the average citizen would sleep very soundly. The commerce of the United States is growing in tremendous leaps and it is for its protection that a navy is needed. The navy must keep pace with it. While it is in a measure true that trade follows the flag it is a more accurate statement of the case to say that the flag follows trade. While the possession of outlying colonies will stimulate American trade in them and demand naval bases among them, still the preponderating foreign growth is elsewhere. As a city grows it needs more policemen to patrol its streets; and as the mercantile marine develops it needs more warships to patrol the seas. The object sought in both cases is guardianship. The American navy has got to grow.

Discussing the shipping bill, Senator M. A. Hanna said in a recent interview:

"The ship subsidy bill will come up before the senate during the winter, but at what time it is impossible to state. I know of no particular changes, and it will probably go through as it is, unless Senator Frye has seen fit to make alterations. I cannot discuss the particulars of this bill without assuming something that does not belong to me. It is Frye's bill. He has been working on it for ten years. It is an excellent measure and ought to be passed. I cannot discuss the probabilities of its passing, for I know nothing about the attitude of congress further than is already known from last winter's session."

There is really no reason why the bill in its present form should not pass. The Democratic minority last winter was opposed more to the form of the measure than the principle which it contained. It was amended in various particulars to meet their views, and, doubtless as finally amended, had it been put to a vote, would have passed. The movement for the rehabilitation of the merchant marine should be begun early in the session in order to insure a speedy passage and to prevent its being lost in the crush of legislation that invariably marks the close of congress.

The oft repeated statement that steam has driven the sailing vessels off the seas will not bear analysis. Steam has driven the sailing vessel out of the passenger service, but it has not made such inroads elsewhere as a cursory view of the subject might lead one to believe. The port of Baltimore has the distinction of being the fourth of commercial maritime importance on the Atlantic coast and yet 60 per cent. of its tonnage is sailing craft. To be sure few of these sailing craft ever venture far beyond Chesapeake bay. But, surprising as it may seem, especially to those familiar with the absolute dominion of steam upon the Great Lakes, the proportion of sailing vessels which obtain elsewhere is even greater. Lloyd's report, just issued, shows that 70 per cent. of the tonnage to Calcutta last year was sail. Nearly one-third of the ships constructed in the United States are sailing vessels and more than one-half of those built on the Clyde are sailing ships. When promptness of delivery is not required the sailing ship has a great advantage. It will thrive where a steamer will starve.

Sir Charles Dilke, at a meeting of the Shipmasters' Society in London recently, called attention to the dearth of native seamen in British merchant ships, and thought that some means should be taken to remedy the deficiency. This question came up in the house of commons, last March, as to the constitution of the crews of the transports, and Mr. Goschen confessed that he was startled to see how large a proportion of the crews were foreigners. In some cases the whole of the deck hands of the transports were foreigners, and in other cases fourteen out of sixteen were foreigners. The regrettable part of this is, of course, that the navy recruits from the merchant marine. The same condition in a degree was discovered upon inquiry in the United States navy about ten years ago, but efforts were made at that time with success to induce Americans to enlist. It is quite essential that a fighting ship should have its inspiration in the patriotism which nationality begets.

The naval museum at the Charlestown navy yard, Boston, has been closed by order of Admiral Sampson. Relics and valuable souvenirs have been mysteriously disappearing and the Admiral thought it best to close the place, until some arrangements can be made for the care and preservation of the property on exhibition. The collection is the property of the naval lyceum and institute, whose membership at one time comprised many of the officers stationed at the navy yard and a large number of prominent citizens of Charlestown. Not being government property the yard officials do not consider any obligation resting upon them in the matter of protecting the property, although from time to time they have assigned a sailor or marine to look after the rooms. The transfer of the collection to the old frigate Constitution has been suggested.

THE CLYDE AND NEW NAVAL CONTRACTS.

From Engineering, London.

The contracts for the new armored cruisers of the County class, tenders for which were received by the admiralty from ten firms throughout the United Kingdom on the 3d ult., were placed on the 25th ult., three of the four vessels required going to Clyde building firms, and one to the renowned Elswick works on the Tyne. One vessel has been placed with the Fairfield company, one with the London and Glasgow company, and one with William Beardmore & Co., formerly R. Napier & Sons, all in the Govan district of the Clyde, while Elswick has been entrusted with the fourth. The following, approximately, were the amounts of the tenders sent in for the hulls by eight of the ten firms who were invited to quote:

Fairfield	£516,500
Beardmore	517,000
London and Glasgow	527,000
Elswick	550,000
Scott & Co.	552,000
Laird's	552,000
Palmer's	574,000
Swan & Hunter	604,000

The fact of the lion's share of the new work having been entrusted to Clyde builders may possibly suggest the notion of favoritism to some minds; but a brief examination of the considerations which have evidently weighed with Mr. Goschen and his colleagues in the allocation of the work is sufficient to dissipate such an assumption. First of all, the vessels have been given to the four lowest tenderers, and this of itself is justification enough under any ordinary circumstances. In the next place, the three Clyde firms, as well as the one on the Tyne, have had a greater experience in building modern warships than can be claimed by any other firms throughout the kingdom, except, perhaps, the Thames Ironworks and Ship Building Co.

The consideration of distributing the contracts amongst such firms as are in a position to undertake, and have the best prospects of rapidly completing the work, has also very largely influenced the lords of the admiralty. Such a consideration, in fact, weighed with their lordships in first of all selecting the firms who should be asked to tender, and it even led them to pass over firms of note—on the Clyde as elsewhere—whose situation as regards work on hand was not such as pointed to the prospect of rapidity in executing fresh work. So far as the successful Clyde firms are concerned, there is nothing standing in the way of the rapid construction of the vessels just placed. At Fairfield, with the five or six berths available for work of this heavy class, only two cruisers are now on the stocks—the armored cruiser Good Hope, of 14,000 tons displacement, and the 9,800 ton cruiser Monmouth.

The Good Hope will be launched in January next, and the Monmouth shortly thereafter. Rapid progress is being made with the fitting out of the Aboukir in the company's wet dock. The London and Glasgow Co. has only the cruiser Bedford—sister ship to the Monmouth—on the stocks, with which it is progressing rapidly, and it has another cruiser to lay down. The only government work at the Beardmore establishment consists of a store ship recently ordered. Mercantile work, too, in each of the three establishments, is meagre in quantity, so that altogether matters, so far as building room and facilities are concerned, favor celerity in the construction of the new vessels.

Of the Beardmore firm it may be remarked that, under the old designation of Robert Napier & Sons, it had a long and distinguished admiralty connection, although no naval contract has been undertaken for some years, the cruiser Gibraltar, built in 1892-3, having been the last executed. There is reason to believe that the connection may be resumed with greater advantage to the admiralty and the navy than ever, the new firm being in a position to supply the armor as well as other plating for the hulls of the vessels entrusted to it. Most of the cruisers now under way on the Clyde have had nickel-steel armor plating supplied by the Parkhead works of Beardmore & Co., and the money value of all the armor plating being made by it was recently estimated at close upon a million sterling.

As regards the engines and boilers for the new vessels, Fairfield, the London and Glasgow Co., and, of course, Elswick, will each furnish its own engines, but in the case of the Beardmore vessel the machinery will be supplied by Humphrys, Tennant & Co., London. It has been stated that the reason why Beardmore & Co. are not themselves supplying the engines is because their engine shop is "not on the admiralty list." Before sending in their specification they took tenders from outsiders, the Fairfield company and Scott & Co., of Greenock, having been invited to name their price, as well as Humphrys, Tennant & Co. The reason above assigned for this appeal to outside firms has been subject of comment in Clyde engineering circles, and has, in fact, taken many people by surprise. Only eight years ago the engine works of R. Napier & Sons were busy with the engines and boilers of the first-class cruiser Gibraltar, and not many years earlier they took the lead in supplying the first triple expansion engines ever fitted on board vessels of war. When the admiralty in April, 1885, invited private builders to tender for the five belted cruisers of the Australia and Galatea class, Messrs. Napier were successful in receiving the order to construct the two named. The engines for all these vessels were at first specified to be of the ordinary compound type of 7,500 H.P., but Messrs. Napier proposed as an alternative scheme to fit triple-expansion engines, undertaking to develop 8,500 H.P., without taking up any more space in the vessel, or increasing the collective weight of machinery and coal. Fortunately, the admiralty authorities were far-seeing enough to appreciate the enormous advantage which such an increase of power gave to those vessels, without diminishing their efficiency in other respects, and they determined to carry out the change which Napier & Sons suggested, not only in the two vessels building by them, but also in the three others under construction in other yards. The British admiralty, however, were not the first in the field in adopting triple-expansion engines, as the Napier firm had on hand, at the time they booked the contract for the Australia and Galatea, engines of 13,000 I.H.P. for the Sino-ope building at Sebastopol.

That works undertaking such highly important productions, and leading the way in vital new departures, up till comparatively recently, should now be "off the list," is surely remarkable, and it cannot be that such an

enterprising firm as Beardmore & Co. will permit this long to continue—if it really is as represented. Possibly it is only in view of the fact that the firm have acquired fresh ground for entirely new ship building and engineering works further down the Clyde that they are apparently content to have it go forth that they are not eligible meantime as engine builders for naval ships. The new establishment, for which plans are being prepared and arrangements made, will be in every way worthy of the Clyde as a naval ship building center. The position of the Scottish river in this respect at present is beyond dispute as high as ever, for on its banks and in its waters naval tonnage of a larger aggregate than at any other center is being busily dealt with. As to the details of the new ships, the following particulars of the Lancaster, to be constructed at Elswick, may be taken as applying generally to all the armored cruisers:

H. M. S. LANCASTER.

Length over all, 463½ ft.; length between perpendiculars, 440 ft.; breadth, extreme, 66 ft.; draught, 24½ ft.; displacement, 9,800 tons. Armament—Fourteen 6-in. quick-firing guns, four in pairs in barbettes, ten in casemates; ten 12-pounders, two at on main deck, two forward on main deck, six on upper deck broadside; three 3-pounders; eight machine; two submerged torpedo tubes forward on broadside. Armor—Partial belt from stem to after magazine; from after end to forward magazine 4-in., reduced to 3-in. and 2-in. at bow; bulkhead aft, 3-in.; casemates, 4-in.; barbettes, 4-in.; conning tower, 9¾-in. and 7¾-in.; protective deck, ¾-in. before armor bulkhead; protective deck, 2-in. abaft armor bulkhead. I.H.P., 22,000 8 hours' trial normal draught. Speed, 23 knots. Engines, 37 in., 60 in., 69 in., 69 in. cylinders, 42 in. stroke. Boilers, 31 Belleville, latest type. Coal capacity, 800 tons normal, 1,600 tons full.

IRON ORES OF NOVA SCOTIA.

Mr. George B. Cowlan of Halifax, N. S., in a letter, recently published on the new iron ores of Nova Scotia, says:

Nova Scotia has ores to equal, in quantity, those of Alabama, and in quality they run over 50 per cent. metallic iron, are free from sulphur and titanium and contain about ½ per cent. of phosphorus. It naturally follows that Nova Scotia will soon be heard from in the iron trade of the world. The whole northwestern side of Nova Scotia, along the Bay of Fundy, which separates it from Maine and Massachusetts, and along Northumberland straits, which lie between it and Prince Edward's island, from Yarmouth on the southwest to Cape St. George on the northwest, is an extension of the Appalachian Highlands coming up from Alabama. And it shows iron from end to end, but in no commercial quantity or on an important scale except in the extreme northwestern county—Antigonish—which terminates in Cape St. George. But here it makes up. The county is a peninsula. On one side the straits of Northumberland. On the other George Bay, which meet at Cape St. George. The Northumberland straits are a part of the Gulf of St. Lawrence, and that side of the county is known as the Gulf Shore. Running along parallel with this gulf shore, a mile and a half to two miles distant, is a range of mountains varying in height from 650 to over 1,000 ft. and the core of it is taken up with a mass of vertical veins of iron ore. I saw the region last spring and went up again to see it after a good deal of development work had been done, in some cases changing the showing of four months ago, but on the whole enlarging it greatly. The veins have a general course of about south 70 degrees west—more easterly and westerly than north and south. In the gorge of Doctors Brook, which cuts these veins deeply and at right angles, in all nine veins had been opened up in a way to show their faces, walls and condition in place. The series of veins as now showing in place, are nine in number, with a total of 84 ft. All these veins have been traced east and west of the gorge throughout the length of the range. Summed up it is a proposition of about this size—from 50,000,000 to 75,000,000 tons per mile, for 11 miles, above sea level, with more below, the 50,000,000 based on veins already uncovered, the 75,000,000 per mile based on what is likely to be found in other veins and below sea level. Along the southern side of this range of iron and northeastward from it extending over to George Bay, and the straits of Canso, which open the way to the Atlantic, is a coal field, as yet undeveloped, but in which two large seams of coking coal are known to exist. The waters on both the gulf shore and the shores of George Bay are very bold, giving five to six fathoms anywhere at a distance of 80 to 100 yards from the beach. A line of railway has been surveyed to connect the range with the Inter-Colonial railway, a dozen miles to the south, and piers will be built on the Gulf Shore and on George Bay for shipping ores on a large scale both to the United States and England. We have been hearing a great deal about the Belle Isle ore of Newfoundland that Mr. Whitney purchased for the Dominion Iron & Steel Works at Sydney. But the Antigonish deposit is at least twenty times as great in quantity, equally good in quality and has coal alongside. The region will make another Birmingham.

REPAIR WORK AT NEWPORT NEWS.

Newport News, Va., Nov. 14.—The ship yard here is very busy just at this time. On the weekly pay roll there are about 5,800 names. This is about as large a force as has ever been employed and includes the men working on the new dry dock. Repair work is a great feature just now. Besides the transport Buford and the North German Lloyd liner Main, there is no end of smaller repair work constantly on hand. One of the largest of the recent jobs of this kind has been on the English tramp steamer Somerhill, which was beached during a storm at Cape Charles some time since. She has had an entire new bottom and has also had a new propeller and stern post fitted.

Some idea of the rush of work in the repair department may be obtained from the fact that the other day a vessel owner, wishing to have his ship docked, found that there were thirty vessels ahead of him. The new dry dock, which will be ready in March, will relieve this to a large extent.

Joseph Spencer Kennard, one of the American commissioners at the Paris exposition, who returned on the steamship La Touraine from Havre this week, says that he learned from a trustworthy source that Russia intended soon to order five more battleships from firms in the United States.

FOUR DAY BOAT.

WE HAVE NEARLY REACHED THE LIMIT OF ECONOMICAL SPEED WITH OUR PRESENT FORM OF HULL AND TYPE OF MOTOR POWER.

(From the *Scientific American*.)

The development of the transatlantic steamship has reached a point at which it shows a decided tendency to follow along two widely divergent lines. On the one hand we have the fast high powered express steamer, carrying only mails and passengers, in which the customary cargo space is monopolized by engines and boilers; while sharply distinguished from this is the vessel of large cargo and passenger capacity, but of moderate speed. Of the latter type the *Ivernia* of the Cunard Co. is the latest and largest representative, while the Hamburg-American liner *Deutschland* is the latest and fastest and most extreme of the high speed passenger ships.

It is claimed by the companies which have given up the construction of abnormally fast vessels that they do not, and in the nature of things can not, pay; yet we find on the other hand that the North German Lloyd Co., who have had sufficient experience with the *Kaiser Wilhelm* to judge intelligently of the question, are planning and building vessels that are to surpass in speed and size anything afloat.

While the representatives of the companies are naturally reluctant to give exact figures, the data contained in the accompanying table may be relied upon as sufficiently accurate for all purposes. To show how nearly we have in the *Deutschland* reached the limit of economical speed, we have calculated the proportions and leading particulars of a four-day express steamer of 30 knots; and it will be at once evident to our readers that unless some radical change is made in the present methods of producing and utilizing steam as a source of motive power, the 30 knot liner is not likely to get beyond the paper stage.

Ivernia.—The *Ivernia* is the latest representative of a type of huge vessels, half cargo, half passenger, which of late years has become very popular, both with the steamship companies and the traveling public. The first of these to visit the port of New York was the *Pennsylvania*. She was followed by such vessels as the *Cymric*, *Pretoria*, and *Grosser Kurfürst*, the latest representatives being the *Ivernia* and *Saxonia* of the Cunard Co. As these vessels are of moderate speed, it is possible to give them very full lines, and they are all of great molded depth, the *Ivernia* measuring 49 ft. 6 in. from the keel to the shelter deck.

The speed being only from 14 to 16 knots, comparatively little space and weight has to be sacrificed to motive power; and as the daily coal consumption is only from 100 to 150 tons, a bunker capacity of from 1,000 to 1,250 tons is found to meet all requirements. These vessels are enormous cargo carriers, the *Ivernia* having four cargo holds forward and three aft of the engine room, while above these are two decks, also entirely devoted to cargo. When fully loaded she can accommodate 11,610 tons of actual dead weight, while her measurement capacity at forty cubic feet to the ton is 24,000 tons.

The type is so deep and stable that it is possible, by carrying up the structure of the vessel amidships to an unusual height above the water line, to provide unusual passenger accommodations, the *Ivernia* being provided with seven decks in all. Above the hold and the orlop and lower decks, which are given up to cargo, there are three other decks, known as the main, the upper and the shelter decks, which extend entirely from stem to stern. The main and the upper decks are given up to third-class passengers, while the shelter deck is devoted mainly to first and second-class passengers. For a distance of over 300 ft. amidships there are two other decks, called the bridge and promenade decks, on which first and second-class passengers are accommodated. There is provision altogether for 160 first-class passengers, 200 second-class and 1,600 third-class, so that in addition to carrying a paying load of 11,610 tons of cargo, this vessel provides for about 2,000 passengers. She burns but little coal, requires but a small engine and boiler-room staff, and hence the running expenses in comparison to her size and earning capacity are very low.

By the courtesy of the managers of the various steamship companies, we have been enabled to compare the average receipts and expenses for several of these big freighters, and we find a remarkably unanimous opinion that the greatest receipts for a single passage of a ship of the type of the *Ivernia* are about \$50,000; the revenue from the westward voyages being derived mainly from passengers, and that from the eastward voyages from freight. We have estimated the average cost of one passage at \$20,000; figures which go a long way to explain the popularity of these vessels with the ship owners.

by her finer form; yet in raising the speed from 16.5 to 23.36 knots, the horse power has to be increased from 10,500 to 37,000 while the coal consumption runs up from 150 to 572 tons per day. So completely does the motive power fill up the hold that the cargo capacity is reduced to 600 tons, this amount being the maximum that she can carry. As a matter of fact, the *Deutschland* usually carries no cargo, 10 tons being, we believe, the most she has ever taken aboard. To keep the enormous aggregate of machinery in motion requires the services of 240 engineers, oilers, stokers, etc., and the whole ship requires a crew, including the engineer's staff, of 550 men. The carrying of the cargo being out of the question, the four decks above the boiler room are given up entirely to passengers, of whom she can carry 450 first-class, 300 second, and 300 third-class.

The running expenses of such a vessel are necessarily enormous. To take one item alone, the coal, we find that the cost, for the six days from New York to Hamburg, assuming an average price of \$4.50 per ton, is about \$15,500. In addition to this, and even more costly, are the fixed charges against the vessel, the most serious of which are the depreciation and the interest on first cost, which cost in the case of the *Deutschland*, amounted to \$3,300,000. It is customary to reckon depreciation in the case of these fast boats at 10 per cent. of the first cost, and this for the reason that as soon as they are exceeded in speed by other vessels, they quickly lose their popularity and therefore their earning power. Moreover, the hard driving to which they are subjected induces a more rapid deterioration than occurs in slower vessels. Probably the fairest way to reckon depreciation on such high-speed vessels is to assume it as 10 per cent. until half of the cost has been covered, and then reduce the rate to 5 per cent. Depreciation and interest, coal, wages of the crew, cost of provisions, dockage, tonnage dues, insurance and other items will bring up the total cost of one passage of the *Deutschland* to \$50,000.

Does such a vessel pay? Popularly, it is supposed that she does not; but the experience of the *Deutschland* during this her first season gives reason to suppose that she is certainly not a losing investment. The popularity of these very fast boats enables the companies to realize correspondingly higher prices for accommodation. As a matter of fact, we know that on a recent westward run of the *Deutschland* the total passenger fares taken in amounted to \$143,000, and the fares on the return passage brought up the total for the round trip to over \$200,000. This sum representing the receipts from passengers alone, without taking into consideration what was received for carrying the mails. Since the cost of running the boat for one round trip, including fixed charges, is \$100,000, we see that a profit of about \$100,000 was realized in the space of three weeks. It must be remembered, however, that these figures represent the best voyage, and the receipts will not be so high throughout the rest of the summer season. Judging from these figures, it is likely that while for six months of the season she shows a profit, for three months of the year the *Deutschland* will only about make her expenses, while for the other three months she will probably be in dry dock and refitting for the next season's traffic, during which period the fixed charges will be accumulating against her. Altogether, it is likely that if only a moderate proportion of the heavy subsidies earned be taken into account, placing the boat in this respect on the same basis as her English and American competitors, the *Deutschland* will show a creditable margin of profit in the year's service. Over and above this there is to be reckoned in the world-wide prestige which undoubtedly accrues to the line which owns the fastest vessel.

Four-Day Liner.—As to the possibilities of the future, it is evident that with our present form of hull and type of motive power, we have nearly reached the limit of economical speed. To drive the *Deutschland* at 30 knots would require about 83,000 horse power, two and a quarter times as much as she now possesses. If Scotch boilers and slow-revolving engines were provided in the design of a 30 knot *Deutschland*, it would be impossible to put into her shell more than one-half of the necessary amount of power. Evidently to secure 30 knots a larger boat would be required, and a larger boat means increased power to drive the increased weight. The increase in power, however, would not be directly proportional to the increase in the displacement, the longer ship being ton for ton easier to drive, because of the refinement of her lines due to her greater length. Nevertheless, by the time we have designed a boat large enough to carry power corresponding to a speed of 30 knots, we shall have upon paper a mammoth ship, 930 ft. over all, 87 ft. in beam, and 30 ft. in draught, and will displace about 40,000 tons. Engines of 110,000 H.P. would be required, and even if triple screws were used, it would be necessary to develop 37,000 H.P. on each shaft—a task that would stagger the best of the world's engine builders of today. Forty-four double-ended Scotch boilers would be required to supply the steam, and during each

Displacement in tons.	Horse power.	Speed.	First cost.	Coal burnt per day, tons.	Bunker capacity, tons.	Cargo capacity, tons.	Passengers.			Crew.	Estimated receipts for full ship, one passage, exclusive of mails.	Cost of one passage.
							First.	Second.	Third.			
Ivernia	21,000	10,500	16.50	\$1,625,000	150	1,250	11,610	160	200	1,600	250	\$ 50,000
Deutschland	23,000	37,000	23.36	\$3,300,000	572	4,500	600	450	300	300	550	*\$143,000
Four-day liner	40,000	110,000	30.00	\$6,200,000	1,710	9,550	None.	800	450	250	750	\$225,000

*Actual value of passenger fares on a recent westward trip.

Deutschland.—In the *Deutschland* we see the latest development of the high-speed-liner. From whatever point of view she is regarded, she has been such an unqualified success that she lends herself admirably to the present comparison. She is not only the fastest and most powerful but, by virtue of her coal consumption of 1.45 pounds per horse power per hour, including auxiliaries, she is considerably the most economically-driven big vessel afloat. Compared with the *Ivernia*, she is 86 ft. longer, has 2 ft. 6 in. more beam, and 5 ft. less molded depth. Her working draught of 29 ft. is probably about a foot less, and on this draught, in spite of her much larger dimensions, she displaces only 2,000 tons more than the former vessel, the comparatively small increase in displacement being due to her yacht-like lines.

The larger displacement of the *Deutschland* is partly compensated for

day's run of 24 hours 1,710 tons of coal costing \$7,700 would have to be fed into the 352 furnaces. It would require 7,300 tons of coal to carry the vessel to Plymouth and 8,550 tons to take her to Hamburg, the cost of the fuel alone being \$38,000. The ship would have to stow 9,550 tons of coal in her bunkers for a single trip across the Atlantic.

To anyone who has watched the reverse bending strains to which a ship like the *Deutschland* is subjected when she is being driven across the Atlantic seas, it is evident that we have come to a point where it will be necessary to give increased longitudinal strength to any vessel that exceeds the present length of 700 ft. In a four-day liner this might be provided for by running a longitudinal stiffened bulkhead, extending from the keel to the promenade deck, through the vessel between the after engine room and the forward boiler-room bulkheads. The vessel might

be further strengthened by carrying up the side plating to the promenade deck, which is placed one deck higher than in the *Deutschland*, and by doubling the plating at the bilges and at the promenade deck, as shown in the midship section of the ship.

In conclusion, it is safe to say that such a vessel as this will never be built. We shall cross the Atlantic in four days, but not with a vessel of this type. The higher speed will be attained, not by multiplying engine and boiler weights, but rather by multiplying pressures and speed, and utilizing every refinement in the way of economizers, superheaters and feed-water heaters, as is being done by Mr. Mosher in his 40-knot craft, the *Arrow*. If a 30-knot transatlantic steamer makes its appearance within the next few years, it is safe to say that it will be driven by the combination of water-tube boilers, using hot, forced draft, with fast-running reciprocating engines, using superheated steam, or with turbines of the Parsons type. So great will be the reduction of weights and saving of space achieved by this change, that it will be quite within the possibilities to produce on a displacement not much greater than that of the *Deutschland* a 30-knot ocean steamer that shall have equal accommodations for passengers.

PROGRESS OF NAVAL CONSTRUCTION.

The monthly summary of the progress of construction of vessels, building for the United States navy, shows a fair gain for October. The two submarine boats which are to be built by the Union Iron Works, San Francisco, have not yet been laid down, but those building at Lewis Nixon's yard, Elizabethport, N. J., are making steady progress. There is considerable gain to be noted, too, in the construction of the Denver class of cruisers. Following is the summary:

		Degree of completion.	Per cent.
		Oct. 1.	Nov. 1.
BATTLESHIPS.			
Illinois	Newport News	85	86
Alabama	Cramp & Sons	99	99
Wisconsin	Union Iron Works	97	97.5
Maine	Cramp & Sons	36	37
Missouri	Newport News	15	17
Ohio	Union Iron Works	30	32
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	29	31
Des Moines	Fore River Engine Co.	7	9
Chattanooga	Lewis Nixon	11	13
Galveston	Wm. R. Trigg Co.	2	2
Tacoma	Union Iron Works	3	7
Cleveland	Bath Iron Works	20	25
MONITORS.			
Arkansas	Newport News	42	43
No. 8	Bath Iron Works	68	71
Florida	Lewis Nixon	48	51
Wyoming	Union Iron Works	53	58
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	78	81
Barry	Neafie & Levy	76	79
Chauncey	Neafie & Levy	76	79
Dale	Wm. R. Trigg Co.	83	84
Decatur	Wm. R. Trigg Co.	81	83
Hopkins	Harlan & Hollingsworth	68	68
Hull	Harlan & Hollingsworth	68	68
Lawrence	Fore River Engine Co.	98	98
MacDonough	Fore River Engine Co.	96	97
Paul Jones	Union Iron Works	76	78
Perry	Union Iron Works	76	80
Preble	Union Iron Works	76	78
Stewart	Gas Engine & Power Co.	37	38
Truxton	Maryland Steel Co.	38	43
Whipple	Maryland Steel Co.	38	42
Worden	Maryland Steel Co.	38	42
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	99	99
Bailey	Gas Engine & Power Co.	97	98
Bagley	Bath Iron Works	92	95
Barney	Bath Iron Works	97	97
Biddle	Bath Iron Works	75	85
Blakely	Geo. Lawley & Son	94	96
DeLong	Geo. Lawley & Son	94	96
Nicholson	Lewis Nixon	80	81
O'Brien	Lewis Nixon	82	84
Shubbrick	Wm. R. Trigg Co.	92	96
Stockton	Wm. R. Trigg Co.	97	97
Thornton	Wm. R. Trigg Co.	89	90
Tingey	Columbian Iron Works	61	64
Wilkes	Gas Engine & Power Co.	60	60
SUBMARINE TORPEDO BOATS.			
Plunger	Wm. R. Trigg Co.	85	85
Adder	Lewis Nixon	6	8
Grampus	Union Iron Works	0	0
Moccasin	Lewis Nixon	6	7
Pike	Union Iron Works	0	0
Porpoise	Lewis Nixon	6	7
Shark	Lewis Nixon	6	7

SOMETHING BETTER THAN STANDARD OIL.

Some of the New York bank stocks sell at many times their par value and Standard Oil at \$700 (par value \$100) is the talk of the country, but these high-priced shares pale into insignificance beside the remarkable value attained by an English security, the adventurer's shares in the New River Co., a corporation which was founded in the reign of James I, and which furnishes a part of London's water supply. The last public sale of one of these shares, of which there are less than 100, was in 1896, when it brought at auction the enormous sum of £125,000, or about \$725,000, and at private sale within the last twelve months a slightly lower price was realized for another adventurer's share. The income from each share is now about £3,000 per annum, so that an investment in them is far from unproductive, and it also seems that the company is the owner of a large amount of valuable real estate in London which was leased long ago at nominal rentals, but the leases for which will terminate in a few years. Under these circumstances the London financial papers indulge in some speculation as to the price which will be obtained for another share which is to be offered at auction in a short time.

The Union Iron Works, San Francisco, will build a coasting steamer for the Pacific Coast Steamship Co. The new steamer will be 276 ft. long, 40 ft. beam, with a depth of hold of 19 ft. 6 in.

TWIN-SCREW DREDGE HERCULES.

The twin screw dredge Hercules, built in accordance with the designs of Mr. Lindon W. Bates of Chicago, by Messrs. W. C. Armstrong, Whitworth & Co., Ltd., at their Walker ship building yard for the harbor authorities of Brisbane, Australia, had a series of trials on the 17th and 18th ult., with most satisfactory results. The Bates system of hydraulic dredging has been hitherto described in the Review, so that it is not necessary to recount it here. The Hercules is the third dredger of the Bates type that has been built this year by the firm of Sir. W. G. Armstrong, Whitworth & Co., Ltd., and a fourth is now nearing completion. The principal dimensions of the Hercules are: Length over all 235 ft. 6 in., length between perpendiculars 230 ft., breadth molded, 39 ft., depth molded 13 ft., depth of hold 11 ft. 3 in. The hull is very substantially built, and has a double bottom. Joggling has been adopted in the shell plating on the Bell and Rockcliffe system. The arrangements of the vessel have been very carefully designed so as to secure the greatest efficiency. At the forward end of the vessel there are two dredging suctions with the requisite lowering ladders, the raising and lowering being effected by means of wire ropes worked from a powerful steam winch of special design, each of these suctions being provided with hollow milling cutters. In this vessel these cutters are formed of blades which are interchangeable and reversible, so that if exceptional wear takes place at one part of the blade, it can be withdrawn and replaced so as to secure greater longevity for the cutter. The blades are made of Siemens-Martin steel plate. In case of the cutters being temporarily choked by debris, a water service through a 2½-in. pipe is provided, whereby they can be quickly cleansed. An operating house is provided forward of amidships on the shade deck, from which not only the lowering and raising of the ladders and forward suctions are controlled, but also the driving of the milling cutters and the anchoring of the dredger when engaged in its actual work. This latter operation is worthy of special note. In addition to the ordinary equipment of anchors and chain cables, and their accessories, the Hercules dredger, in common with some other dredgers, is equipped with three spuds. In the Hercules these spuds consist of Oregon pine 24 in. square and 60 ft. in length, having on the lower end a forged steel shoe. Two of these spuds are placed near the stern and the other forward of amidships. Any one of these spuds when lowered can hold the dredger securely, even in a fast flowing current. They are usually used alternately; the dredger, after clearing a channel within the radius that it can work with one of the spuds in position, that spud is raised and one of the others lowered, whereby the area of operations is changed. At the after end of the vessel, on the main deck, there is another powerful steam winch from which the discharge pipe and the side suction dredging pipe are controlled. Two rudders are fitted at the stern, both working in conjunction, from one of Alley and MacLellan's "Sentinel" steam steering gears, placed about amidships. Actual dredging trials were impracticable on the river Tyne, but in passing through the Suez canal such trials will, we understand, be carried out. The vessel is being taken out to Brisbane under its own steam.

The construction and fitting of the machinery was entrusted to the Wallsend Slipway and Engineering Co., Ltd., Wallsend-on-Tyne. The most important engine in the machinery installation is that which is employed in working the centrifugal pump, of which the discharge pipe is 33 in. in diameter. This engine is of the triple expansion type, having cylinders 18 in., 30 in., and 50 in diameter, 30 in stroke, the initial pressure of steam being 190 lbs. per sq. in., and the full power about 1,800 I.H.P. at 160 revolutions per minute. The propelling engines are also triple expansion. There are two sets, each of which drive a four-bladed screw propeller 6 ft. diameter. These engines are 10 in., 16½ in., and 28 in. diameter of cylinders, 18 in. stroke, and with 190 lbs. pressure of steam attain 170 revolutions per minute. A piston valve is fitted to the high pressure cylinders, and an ordinary double ported slide valve to the low pressure and intermediate pressure cylinders. The engines, which operate the cutters, fitted in connection with the two bow dredgers, are of the compound type, although working with the same initial pressure as the pumping and propelling engines, viz., 190 lbs. per sq. in. These engines are each 10 in. and 20 in. diameter of cylinders, 15 in. stroke, and at a speed of 160 revolutions exert 250 I.H.P. The boilers are of the Babcock-Wilcox marine type, which type was also adopted in the two dredgers already completed by Sir W. G. Armstrong, Whitworth & Co., Ltd. The total heating surface of the four boilers is 12,080 sq. ft., and the total grate area 332 sq. ft. The whole of the machinery and boilers worked without a hitch and to the satisfaction of all concerned.

MR. BURTON ON RIVER AND HARBOR IMPROVEMENTS.

Hon. T. E. Burton, member of congress from Ohio and chairman of the rivers and harbors committee, left Cleveland a few days after election for a trip down the Mississippi river. Referring to river and harbor affairs, Mr. Burton said before leaving Cleveland:

"I expect to reach Washington by Oct. 22. I anticipate that this will be a busy session for me. The rivers and harbors committee has had much to do and the appropriation bill, which will probably be introduced early in December, will be of great importance. There are many projects which are strenuously pressing that will be considered. The principal points which are to be provided for in the bill will be the Boston harbor, the Delaware river below Philadelphia, the mouths of the Mississippi, to make a better outlet at New Orleans; the St. Clair, Detroit rivers, St. Mary's river below the Sault, the Mississippi river from St. Paul to its outlet, the levee system on this river and a general method of improving it."

On his southern trip Mr. Burton goes first to Cairo, Ill., where he joins the Mississippi river commission on a tour of inspection down as far as New Orleans. This trip will be made on board a government vessel and will last about nine days. The purpose of the trip is to determine upon the best method of improving the condition of the river from St. Louis to its mouth. As chairman of the rivers and harbors committee Mr. Burton has been asked by the commission to make the tour, in view of the appropriation to be made this winter for carrying out the work. The commission is headed by Col. G. L. Gillespie, one of the senior officers of the army engineer corps, who is said to have the best chance of promotion to the position occupied by Brigadier General Wilson when the latter retires. The other members are six in number, all well known men, two being engineers from the army, two civil engineers and two civilians.

NEED OF A MERCHANT MARINE.

Henry W. Peabody in the New York Tribune.

Exports of the United States have increased by leaps and bounds to \$1,227,000,000 in value, and imports \$697,000,000. Besides our western farm products, we now lead in the world's supply of coal, iron and steel, and manufactures, implements, etc., are largely shipped abroad. The volume of our exports by vessels in 1898 is estimated to be 28,500,000 tons weight, equal to full cargoes of 4,000 steamships of 7,000 tons weight capacity, a moderate type of boat which is now in the carrying trade, or about seventy-seven dispatches each week. The incongruity in our equipment as a leading nation, a cause for chagrin as we contemplate our great commerce, is our dependence upon the vessels of other countries for the carriage of our goods. Only 8 per cent. of our exports by sea are being carried by American vessels, and only 2 1/4 per cent. of our traffic with Europe. The industry of American ship owning has become almost extinct, but the field is great and well repays the capital and enterprise that undertake it.

In 1799 a law was enacted permitting all vessels then owned by Americans, whether domestic or foreign built, to be registered for foreign trade, and thereafter only vessels built in this country were to be granted registry; the coastwise and inland commerce was limited to vessels built in the United States and owned by citizens and enrolled. This domestic tonnage has grown to about 4,000,000 tons and is actively engaged. The tonnage in foreign trade reached its zenith in 1861—2,643,000 tons. During the civil war there were sold to go under foreign flags 800,000 tons. Our commerce was greatly interrupted, and the investment of capital was diverted to the building of transcontinental railroads. The English-built iron ships proved superior to those of wooden construction, and we could neither build such nor buy those of foreign construction on account of the law of 1799, and it resulted that the protection of the ship builders as to the vessels for our foreign commerce brought to them no orders, but afforded to foreigners open course for their vessels without our competition. Now we have of registered vessels about 800,000 tons, but not one-half of these are adapted to the over-ocean world's commerce, not one-tenth of them the latest type of steamships which the foreigners are building and using in our commerce. The superior quality of American steel and the equipment of a half dozen building plants have in recent years developed construction of battleships and merchant steamships second to no other nation. Our builders do not profess yet to build so cheaply as the English yards, and they are pressed with contracts for war vessels for our government and for other countries and for the foreign and coastwise trade.

President McKinley has been mindful of our emergency, as in his annual message of December, 1898, he recommended, as expressed in detail by the report of the secretary of the treasury, that for a short term privileges should be accorded to our citizens to buy steamships abroad and bring them under American registry for the foreign trade, provided that the owners became obligated to also contract for building in the United States a similar volume of tonnage, and in order to encourage the growth of the dormant industry of vessel owning that a bounty should be paid, according to the mileage of the voyages from or to foreign countries in our commerce. This recommendation was repeated in the president's message of December, 1899. There will not be, there is not lacking, enterprise and capital ready to avail of the privilege, if granted by congress, to quickly commence the re-creation of our merchant marine, and at the same time induce larger orders for American builders than can be realized in any other way. It requires 4,200,000 tons register of vessels constantly employed in our own commerce to serve ourselves. During the period of registry we have sold of our registered vessels to go under foreign flags about 2,250,000 tons, and we may now properly reverse the movement. The report of the commissioner of navigation states that there were built in the year ended June 30, 1899—

Nineteen propeller ocean steamers.....	43,871 tons
Two sailing vessels of steel.....	6,207 tons
 Total	50,078 tons

Also that in Great Britain there were under construction on Sept. 30, 1898, exclusive of warships, 519 steel vessels, of tonnage 1,352,547. The total tonnage of Great Britain is about 14,000,000, mostly steel. If our merchants and investors could buy abroad 1,000,000 tons or 2,000,000 tons register, and then build a like amount in this country, we should acquire in a few years 2,000,000, 3,000,000 or 4,000,000 tons and resume our former rank second to Great Britain as a maritime nation, and the ship building industry would be greatly enlarged.

The English, German and other steamship lines occupying our ports for European trade are all adding to their fleets many new large boats, and making it harder than ever for Americans to establish their vessels if they have them. Certainly there must be no impediment to a quick replenishment of our tonnage, and the new legislation should have as its only aim the re-creation of our merchant marine, and if, as I believe, the plan recommended by President McKinley is the right one, it should be carried into effect. Narrow or partisan legislation will not meet our emergency. We must have vessels enough, and quickly. Give the public the chance to buy and build, and the responsibility will be upon them.

PAYMASTER GENERAL'S REPORT.

The annual report of Paymaster General Kenny of the navy deals in big figures. He shows that last year he spent \$10,659,000 on account of construction and purchase of ships; \$3,933,000 for repairs to ships; \$11,715,000 to keep ships in commission, including pay, \$1,589,000 for the marine corps and \$56,983 for the naval militia. The paymaster general says that the naval storehouse at Cavite has proved of great value as a supply base, and the bureau intends to meet the demands of the fleet for supplies without purchasing on the station, as far as possible. The refrigerator ships have been employed with the most satisfactory results, and have been a veritable boon to the men.

The Craig Ship Building Co. of Toledo is now working on three new steel vessels. An order has just been booked for a passenger steamer—quite a large vessel—for service on Lake Michigan between Holland and Chicago.

ANNUAL REPORT OF LIFE SAVING SERVICE.

The annual report of the life saving service, made public this week, shows that at the close of the fiscal year the establishment embraced 269 stations, 194 being on the Atlantic, 58 on the lakes, 16 on the Pacific, and one at the falls of the Ohio at Louisville, Ky. The number of disasters to documented vessels within the field of operations of the service during the year was 384. There were on board these vessels, 2,655 persons, of whom 2,607 were saved and 48 lost. Six hundred and seventy-three shipwrecked persons received succor at the stations, to whom 1,447 days' relief in the aggregate was afforded. The estimated value of the vessels involved in disaster was \$6,127,500, and that of their cargoes \$3,342,690, making a total value of property imperilled \$9,470,190. Of this amount \$7,264,690 was saved and \$2,235,500 lost. The number of vessels totally lost was sixty-one. In addition to the foregoing there were during the year 329 casualties to small craft, such as small yachts, sailboats, row-boats, etc., on board of which there were 781 persons, 776 of whom were saved and five lost. The property involved in these instances is estimated at \$267,070, of which \$256,770 was saved and \$10,300 lost. Besides the number of persons saved from vessels of all kinds there were 591 others rescued who had fallen from wharves, piers and other positions of extreme peril, many of whom would have perished without the aid of the life saving crews. Five hundred and fourteen of these were rescued from dwelling houses, outbuildings and other elevated places submerged wholly or in part by the terrible flood of the Brazos river in Texas, July 6 to 12, 1899.

The crews saved and assisted to save during the year 371 vessels, valued with their cargoes at \$4,006,590, and rendered assistance of minor importance to 885 other vessels in distress, besides warning from danger by the signals of the patrolmen 194 vessels. While the number of lives and the amount of property saved through these warnings cannot be stated, it is certain that numerous disasters were averted which could but have resulted in loss of property and jeopardized hundreds of lives. The cost of the maintenance of the service during the year was \$1,535,936. The general superintendent calls attention to the justice and necessity of an increase in the compensation of district superintendents who, he believes, are the poorest paid servants of the government, considering the nature and extent of their duties and their heavy financial responsibility, and he makes a strong plea in their behalf.

GREAT FUTURE FOR IRON AND STEEL.

Archer Brown, well known to the pig iron trade of the United States, says in the November Forum:

"The possibilities of the future of the iron and steel industry of America sometimes engage the imagination of our technical writers. If we base our calculations upon the ratio of growth of the past we quickly run into figures that stagger the mind. Nearly half a century ago, before America had reached the half-million-ton mark in production, Mr. Abram S. Hewitt, in an address before the American Geographical Society, predicted that the world would make 28,000,000 tons of pig iron in 1895 and 48,000,000 tons in 1915. On this basis the output for 1899 should have been 35,000,000 tons, but it actually reached 40,000,000 tons, and the consumption, gauged by depletion of stocks, was nearly 1,000,000 tons more. In 1890 Mr. Edward Atkinson estimated the world's pig iron output for 1900 at 40,000,000 tons. These writers merely used the rule of doubling output every twenty years. If the same law is to hold in the future the world will require 80,000,000 tons in 1920; and if America maintains her rate of progress, relatively speaking, she will supply much more than half of it. That would mean trebling in the next two decades our already vast plant of furnaces, steel works, rolling mills and iron foundries, as well as the product of our ore and coal mines. The most optimistic believer in American destiny and progress can scarcely bring himself to these figures. But we must not be too hasty in rejecting them. Mr. Hewitt has been quoted recently as saying that the world is practically rebuilt three times in a century. We are now demolishing in New York the first iron fire-proof buildings erected there thirty-five years ago, replacing them with modern structures. We have scarcely commenced to use steel in ordinary house construction, Germany being far in advance of us in this particular. Every day new uses of iron and steel are found, and construction of every character is yearly growing heavier."

VERY LARGE ORDERS FOR CHAIN.

The Standard Chain Co. of Pittsburg has been awarded a contract by the United States government for buoy and light-vessel or stud-link cable chain, amounting to about 600 tons. This is the largest single order ever placed by the government, and the Lebanon works of the company, which is the only chain works in the country that can handle to advantage such a large order, will produce it. The Standard company has also booked an order from the American Ship Building Co. for all the chain required in the twenty-three new vessels being built by that company, this order amounting to about 450 tons. This, also, is the largest single order for chain ever placed in the United States outside of the government. The material for the American Ship Building Co. order will be made at the Hayden rolling mills of the Standard company at Columbus, O.

ADMIRAL BRADFORD'S TRIP.

Admiral Bradford, chief of the equipment bureau, has gone to the Pacific slope on official business. He goes first to Seattle to dispose of the question as to the location of the branch hydrographic office, thence to San Francisco to look into the controversy of the Mission Rock property, which the navy wants for a coaling station, and finally to San Diego to select from the army lands at the entrance to the harbor a suitable tract for the establishment of a naval coaling station.

E. H. Gerrish of Bangor, Me., is to engage in the business of making boats and canoes.

If you contemplate a trip either west or east you can secure advantages not found elsewhere if you will write, wire, 'phone or call at the city office of the Nickel Plate road, 189 Superior street, 'phone main 218, or ticket agents Euclid avenue station, 'phone Doan 817. Rates and tickets, first or second-class, to any point authorized east or west at any station on the Nickel Plate road.

245, Dec. 31

EXTENT OF DAMAGE TO LINER ST. PAUL.

An examination of the American liner St. Paul was made on Saturday last in the big dry dock of the Brooklyn navy yard by the Cramps, who built her, by her engineer corps and by several officials of the United States navy. The Cramps were surprised at the extent of the damage found. Three of the starboard engines had been destroyed. The vessel will go to Cramps' yards, Philadelphia, for repairs. The steamship's hull was found to be practically uninjured. As the propeller was whirling at full speed when the shaft broke, it would not have been surprising if the hull in the vicinity of the broken shaft had been badly bent and twisted and the outer plates perforated; but no such thing happened and the hull will not have to be touched by the workmen.

The remaining piece of the broken tail shaft has been removed. It had broken off about 10 ft. inside the sleeve. The work of fitting a new shaft may be done in the dry dock or not until the St. Paul reaches the Cramps' yards. When the new propeller is put in she will have to be docked again. An effort will be made to obtain the use of the same dock in the Brooklyn navy yard that the steamer is using now. If the government will not consent she will be docked at Newport News. The damage to the starboard engines will keep the vessel out of commission for about three months, notwithstanding the fact that the American line is much in need of her. In the party that visited the St. Paul were Charles H. Cramp, Edwin S. Cramp, Frank L. Cramp and J. H. Mull, chief engineer of the Cramp Ship Building Co. Several officials of the American line met them at the navy yard and went over the ship with them. After the inspection Mr. Charles H. Cramp said: "The St. Paul must have been subjected to an awful strain. Nothing broke. The working parts simply tore apart."

THORNYCROFT ON SUBMARINE BOATS.

Most naval experts in England are still disposed to treat lightly the advancement that is being made with submarine boats. But the British admiralty has lately decided, just the same, to grant an official trial to a submarine boat designed by J. E. Howard of Tasmania. Mr. Thornycroft, builder of torpedo boats, says it is not necessary for Great Britain to build submarine boats, even if the experiments of other nations have been quite successful. He regards the American submarine boat as the best type yet made, but he doubts its efficacy, even for harbor defence.

"A shell dropped in the neighborhood of a submarine boat," said Mr. Thornycroft, "and exploded either on a level with or below it, would afford sufficient shock to crumple up the boat. Possession of a submarine boat of your own will not help you to find an enemy's. They are at present of too limited range and insufficient propelling power to be really a serious factor, and the unsatisfied problem of keeping a level keel under water is yet to be solved. If I ever have to go under water with a submarine boat I will prefer to sit outside."

Some time ago the wives of members of the Ship Masters' Association in Cleveland concluded that if their husbands were deriving advantage from an organization that was of a social and beneficial kind they

might also find something to do in an auxiliary body. They enlivened the social gatherings of the Ship Masters and brought them some new members. They also found time through effort of their own to collect a fund for charitable purposes. This fund was expended, a few days ago, in a very commendable way. The orphans and homeless children who are cared for at the Jones Home on Pearl street, Cleveland, were taken in a special car, kindly provided by the Big Consolidated street railway, to one of the department stores, the May Company, and there provided with a large supply of shoes and clothing.

The Harlan & Hollingsworth Co., Wilmington, Del., have petitioned for the removal of a center pier from a drawbridge crossing the river near their works. The pier interferes with the safe navigation of large steamers.

PHOTOGRAPHS OF LAKE VESSELS.

It is not an easy matter to secure good photographs of lake vessels, even in the connecting rivers. This is especially true when an effort is made to get large pictures. A photographer who spent a couple of weeks in September on the St. Clair river making pictures for the Review did not succeed in getting all that he expected, but some of the views are very fine. The negatives are 11x14 in. No photographs of this size are to be had from any other source. There is no background in any of them—just clear sky and open water. Following is the list:

STEAMERS.

Angeline	Iosco	Pontiac
Birckhead, P. H.	Iron King	Pridgeon, John, Jr.
Boston	Kaliyuga	Princeton
Boyce, Mary H.	Leafield	Queen City
Buffalo (two views)	Linn, Wm. R.	Ravenscraig
City of Alpena	McWilliams, John J.	Rees, W. D.
(Side-wheeler)	Maruba	Reis, Wm. E.
Conestoga & Monarch	Mariposa	Rhodes, W. C.
(on one print)	Mataafa	Sacramento
Davidson, Thos.	Mills, Robt.	Saxon
Delaware	Nicholas, I. W.	Susquehanna
Eddy, John F.	Nicol, John M.	Sparta
Hanna, M. A.	Northern Light	Stevens, W. H.
Harper, John	Northern King	Syracuse
Hopkins, Mark	Penobscot	Tuscarora
Huron	Pittsburg (Pass. stmr.)	Wilbur, E. P.

TOW BARGES.

Abyssinia	Chattanooga	Olive Jeanette
-----------	-------------	----------------

A single print will be delivered to any address, express prepaid, at \$1.50, or \$5.00 for four. These photographs are too large to trust to the mails. If called for at the office of the Marine Review, Perry-Payne building, Cleveland, copies may be had at \$1.25 each.

"LITTLE GIANT" Pneumatic Tools

Recognized by the

Mechanics of the World to be the Most Efficient and Practical AIR Tools Manufactured.

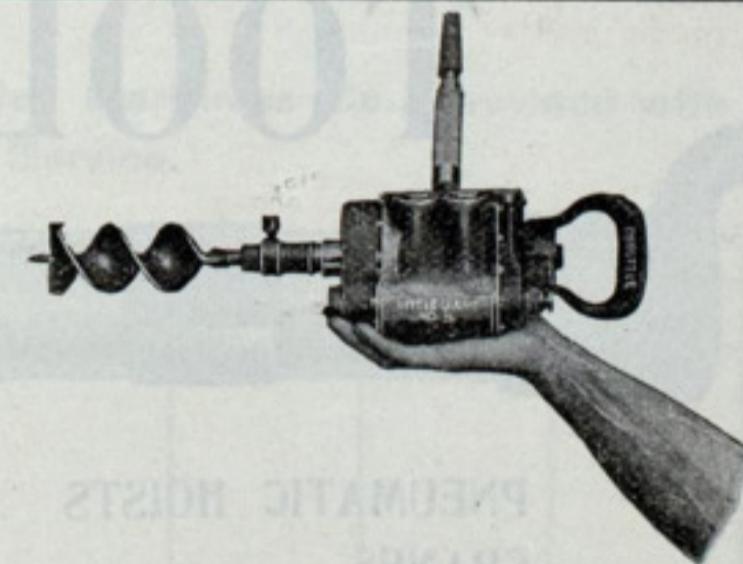


New "Little Giant" Long Stroke Hammer.

"The Best Yet." Will Drive Perfectly One Inch Rivets. No Vibration. Guaranteed Against Repair for One Year. Our Hammers are unexcelled for all classes of Riveting, Chipping, Calking, Beading, Etc. MADE IN ALL SIZES.

SENT ON TRIAL.

Send for our latest Catalog "E." It will interest you.
We make AIR DRILLS of all kinds.



The "Little Giant" Reversible Boring Machine No. 5

Especially Designed for Shipyard and Dock Work. Will Bore up to 4" in Diameter in any kind of wood. Piston type. Weight, 14 lbs. Very Powerful. Will perform the work of five men. In use in all the U. S. Navy Yards and Large Shipyards.

STANDARD PNEUMATIC TOOL COMPANY,

MANUFACTURERS OF PNEUMATIC TOOLS AND APPLIANCES OF EVERY DESCRIPTION.

General Offices—Marquette Bldg., CHICAGO.

Eastern Offices—141 Broadway, NEW YORK.

Branch Offices in all the Principal Cities of the World.

TRADE NOTES.

The Bethlehem Steel Co. has again opened an office in St. Louis. They will be represented at No. 930 N. Main street, that city, by Mr. S. E. Freeman.

The J. A. Fay & Egan Co., 325-345 West Front street, Cincinnati, well-known manufacturers of wood-working machinery, has just published a pamphlet containing instructions on the erection and care of band saw mills and band saws of all kinds. As the Cincinnati manufacturers are leaders in their line and have had a very extensive experience, their views carry great weight. The pamphlet will prove very interesting to all those using band saws. Copies will be furnished free on request.

A marine gasoline engine of the kind manufactured by the Lake Shore Engine Works of Marquette, Mich., will have a place in the exhibit of the United States life-saving service at the Buffalo exposition. This engine has proved highly successful in tests of life boats in the roughest kind of weather. A 6 H.P. engine manufactured by the Marquette company is carried by small sailing crafts for the purpose of avoiding tug bills in entering and leaving port. This engine will undoubtedly come into general use for tenders.

The "Perfection" berths, of which Lein, Irvine & Co., 328-332 East Twenty-third street, New York, manufacture a complete line, including mattresses, pillows and bedding, are coming into general favor for vessel use on account of the many new features they possess. They cannot get out of order, will last as long as the vessel, fold up out of the way, and can be removed without tools. They are also vermin proof. The company recently fitted out, complete, the transport Kilpatrick with mahogany front berths that fold up.

The Roberts Safety Water Tube Boiler Co. of New York City and Red Bank, N. J., has just paid a tenth annual dividend of 10 per cent., the last installment of 100 per cent. on investment to the original stockholders. This company is now building a 400 H.P. boiler for the steam yacht Admiral, two boilers of 500 H. P. each for one new vessel being constructed by The Craig Ship Building Co. of Toledo, O., and four similar boilers for another vessel. An eighth boiler for the United States revenue cutter service is also being constructed. The year 1900 was the best business year since the formation of the company and prospective orders for 1901 make it appear that even the year 1900 will be eclipsed. A fourth extension of the Roberts works at Red Bank is now being planned, and with this enlargement of capacity the company expects to turn out an average of about one boiler a day.

Engineering of London makes this comment on a Cleveland catalogue: An exceptionally finely got-up catalogue is that recently issued

by the Brown Hoisting and Conveying Machine Co., of Cleveland, O. The readiness with which American manufacturers will sink capital to reduce working expenses receives a number of excellent illustrations in this volume, and the very low cost at which American steel is now produced is in no small degree due to the very ingenious ore-handling plant devised by this firm. A number of their great "bridge tramways," as they are called, are illustrated in this catalogue. The illustrations themselves are of interest from a purely technical point of view, being exceptionally good specimens of half-tone work.

One of the features of the power plant to be provided for the approaching Pan-American Exposition at Buffalo is a complete duplex induced draft apparatus. This will comprise two mammoth full housing up-blast steel-plate fans, standing about 17 ft. high, with overhung wheels and water-cooled bearings. These fans are direct-connected each to a 12x14 in. horizontal center-crank engine with automatic governor, and are designed to serve 17 Manning boilers of about 3,000 H.P. capacity, discharging the gaseous products of combustion into two short stacks of sheet steel. The fans, engines and breaching connections for the boilers, together with the steel-plate stacks, are to be constructed complete by the Buffalo Forge Co. of Buffalo, N. Y. The same company is also building for the exposition a horizontal center-crank class A tandem compound engine of 300 H.P. The cylinders of this engine are 17 and 28 in. in diameter, with a common stroke of 18 in. This machine will be applied to electric lighting purposes. In addition it may be mentioned that the heating and ventilating plant for the permanent New York state building, of which Mr. George Cary is the architect, will also be constructed by the Buffalo Forge Co. The apparatus will consist primarily of a heater and a large centrifugal fan, the latter driven by a direct-connected 15x10 in. class A Buffalo Forge Co. engine.

A very large order for Belleville water tube boilers has just been placed by the British admiralty. There are eighteen of the generators and they are for the cruiser Encounter, which is to be built at Davenport dock yard. They are to be capable of driving the engines at 12,000 H.P.

Hunters' Rates—From Nov. 9 to Nov. 30 the Nickel Plate road will sell excursion tickets to hunting parties of three or more traveling together on one ticket at one fare for the round trip. Return limit Dec. 2. There are immense quantities of small game along the line of the Nickel Plate road in western Ohio and Indiana. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O.

247 Nov. 30.

Paris Exposition, 1900, confers Highest Award and 2 Gold Medals

(Only Gold Medals in this Class.)

HAMMERS

for Chipping
" Calking
" Riveting
" Beading
" Stone Cutting, etc.

RIVETERS

for Shipyard use
" Boiler work
" Bridge work
" Structural work



DRILLS

for Railroads
" Mines
" Quarries
" Foundries
" Machine Shops
" Wood boring

FLUE {
Welders
Expanders
Reducers
Rollers
Cutters

ON CHICAGO PNEUMATIC TOOL CO.

PNEUMATIC HOISTS

CRANES

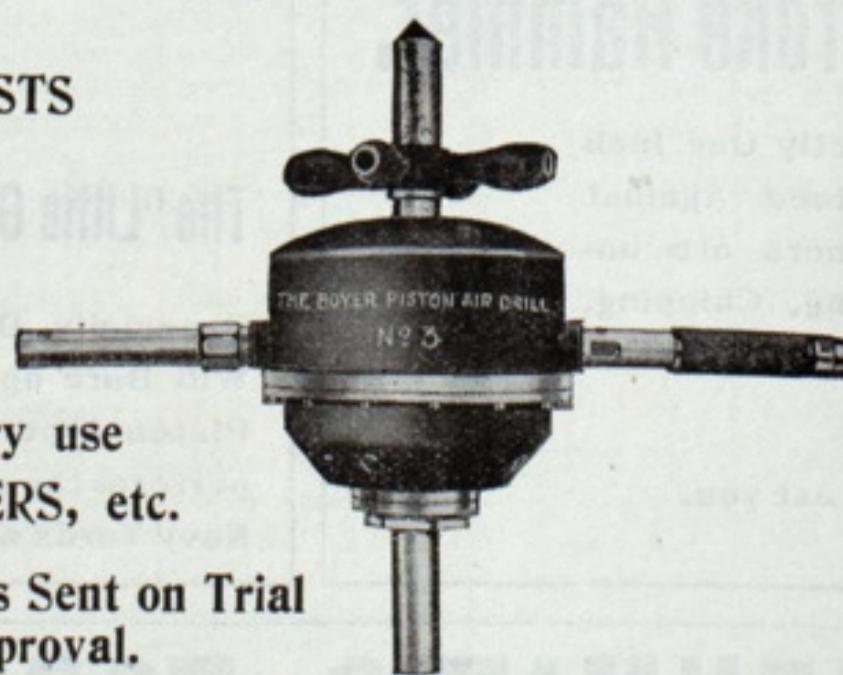
JACKS (Car and Locomotive)

PAINTING MACHINES

MOTORS for every use

CASTING CLEANERS, etc.

Pneumatic Appliances Sent on Trial
Subject to Approval.



By actual statistics 95% of all Pneumatic Tools sold all over the world are our tools.

UNITED STATES COMMISSION
TO THE
PARIS EXPOSITION OF 1900

PARIS
20 AVENUE RAPP

CHICAGO
AUDITORIUM BUILDING

NEW YORK
EQUITABLE BUILDING

PARIS OFFICES,

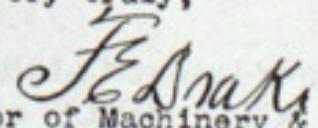
August 21, 1900.

Chicago Pneumatic Tool Company,
Chicago.

Gentlemen:

Officially I desire to inform you that your pneumatic tools received at the hands of the International Jury of Award, a Gold medal. Also that Mr. Boyer was awarded a Gold Medal as collaborator and inventor of the tools.

Yours very truly,


F. E. Drak
Director of Machinery & Electricity.

New York Office: 95 LIBERTY ST. CHICAGO PNEUMATIC TOOL CO. GENERAL OFFICES: Monadnock Block, Chicago.

BRANCH OFFICES: 418 Exchange Building, Boston, Mass. 241 The Arcade, Cleveland, Ohio. Binz Building, Houston, Texas. 316 Lincoln Trust Building, St. Louis, Mo.

1016 Carnegie Building, Pittsburgh, Pa. 421 Market Street, San Francisco, Cal. 605 Fidelity Building, Philadelphia, Pa.

FOREIGN REPRESENTATIVES: THE NEW TATE-HOWARD PNEUMATIC TOOL CO., LTD., General European Agents, 63 Queen Victoria Street, London, E. C. JOHN MACDONALD & SON, No. 9 York Street, Glasgow. SCHUCHARDT & SCHUTTE, Spandauer-Strasse 59-61, Berlin, Germany; Brussels, Belgium; St. Petersburg, Russia; Vienna, Austria; Stockholm, Sweden. H. GLAENZER & PERREAUD, 1 Avenue De La Republique, Paris, France and Spain. H. W. PEABODY & CO., Sydney, New South Wales.

ATLANTIC AND PACIFIC COASTS.

A FEW NEW CONTRACTS ARE TO BE NOTED AND A NUMBER OF LAUNCHES HAVE TAKEN PLACE—EXTENSION OF PACIFIC COAST YARDS.

Steamer Hawaiian, for the American-Hawaiian Steamship Co., was launched last Saturday at Roach's ship yard, Chester, Pa. The vessel has a length of 435 ft. over all; 51 ft. beam; 32 ft. to water bottom; gross tonnage, 6,000 tons. The propelling machinery for the ship will consist of a vertical triple expansion engine with cylinders 27, 45½ and 76 in. in diameter, by 48-in. stroke, designed to indicate 2,500 H. P. at sea. The steam will be supplied by four large steel Scotch boilers, each 14 ft. 9 in. in diameter and 10 ft. 6 in. long, weighing about 45 tons each, working with a natural draft with a common stack, 80 ft. high above the grate. A large donkey boiler, 9 ft. 6 in. in diameter, and 10 ft. long, built for 90 lbs. pressure, will also be supplied. The coal bunker capacity is 1,500 tons, including the reserve bunkers. An electric light plant with a capacity of 100 16-candle-power lamps will be supplied and be ample for lighting the ship well. The Hawaiian has been designed to carry 8,250 tons of freight on a draught of 26 ft. at mean sea of 10 knots per hour. In smooth water, loaded, the ship should be able to make at least 11 knots an hour.

The yacht building plant of C. C. Hanley at Quincy Point, Mass., has been merged into the Hanley Construction Co., with a capital of \$250,000. The officers of the new corporation are: President, L. D. Baker, who is well known in connection with the United Fruit Co.; secretary and treasurer, David Hamlin of Cohasset; general manager, C. C. Hanley. The company has acquired, in addition to Mr. Hanley's plant, a large tract of land adjoining his holdings, with a frontage on Town river, which, together with the deep water, makes it an ideal location for a ship building plant.

Moran Bros. Co., Seattle, Wash., have recently made extensive additions to their real estate surrounding their plant so that they now control about thirty-five acres of land. "The purchase of the property," said a member of the firm, "has been under contemplation for some time. Its acquisition was deemed necessary in order to give added accommodations to our rapidly expanding steel ship building plant. It may not be necessary to mention that we anticipate securing contracts for some of the steel vessels which the government has in contemplation."

Capt. John F. Klein of Pittsburg has awarded a contract to the Excel Docks Co., of Middleport, O., to build a hull for a new towboat that is to be 120 ft. long, 23 ft. wide and 46 in. depth of hold. The new boat will have the engines of the Ella Layman, and James Rees & Sons will put on the machinery and also build the boilers for it. They will be three in number, 24 ft. long and 38 in. in diameter. The boat will be used by Capt. Klein to tow his several excursion barges next summer. The steamer will be complete in every particular.

A large floating dry dock was successfully launched last week from the yard of the Brewer Dry Dock Co. on Richmond Terrace, Elm Park, N. Y. It was the first of its kind ever built on the Island. Miss Ada Florence Shewan broke the customary bottle of champagne against the side of the dock, which is 176 ft. long on the box, with outriggers 30 ft. long at either end, 80 ft. wide, and 35 ft. high. It was built for the firm of James Shewan & Sons of Manhattan, and yellow pine was used in the construction. The cost was about \$50,000.

John B. Hardy of the Hardy Machine Works, Tacoma, Wash., has just closed a deal for the purchase of a ten acre tract of land at tidewater in the flats of Tacoma. Mr. Hardy intends to remove his foundry plant to the new site and to enlarge his marine engine works. It is understood that a portion of his property is to be leased to John J. Hill of Marine City, Mich., who contemplates locating a ship yard there. Mr. Hill was in Tacoma a short time ago looking over the situation, and was favorably impressed with it.

Keels were laid last week at the yards of the Maryland Steel Co., Sparrow's Point, Md., for the two largest steel passenger and freight steamers ever constructed in the United States. The vessels are for the Atlantic Transport Co. and will run between New York and London. The steamers will be duplicates of the Minnehaha and Minneapolis, will cost \$1,500,000 each, and will be delivered next spring.

The new steamer Mainlander, a Tacoma, Wash., product, will be given a trial trip in a few days. The vessel is 162 ft. long, 28 ft. beam and 10 ft. deep. Her engines are triple expansion, the cylinders being 16 by 27 by 44 in. with a stroke of 24 in., fed by two Seabury water tube boilers. Crawford & Reid are building the hull and J. B. Hardy is supplying the engines.

Five-masted schooner Fannie Palmer was launched from the George L. Welt ship yard at Waldoboro, Me., last week. The vessel is the largest ever constructed at Waldoboro. Her dimensions are: Length of keel, 257 ft.; beam, 44 ft. 6 in.; depth, 25 ft. She was built for William F. Palmer and will be commanded by Capt. George B. Williams of Boston.

The steel hull twin-screw ferryboat West Point and the big steel tug S. R. Callaway were launched on Saturday last from the ship yard of Thomas S. Marvel & Co. The former will ply between Weehawken and New York, and the latter will be used for both inside and outside towing. The companion tug, Chauncey M. Depew, will be launched in two weeks.

American capitalists have purchased the plant of N. Evans & Sons, iron and steel ship repairers and boilermakers, at Halifax, Nova Scotia, and are about to construct a large dry dock and steel ship building plant. Over \$1,000,000 will be spent on the works, which will include large piers. The work will begin at once.

The four-masted schooner George C. Thomas, building at McKay & Dix's yard, Bucksport, Me., will be named George C. Thomas, for one of her New York owners. She will be launched about Dec. 15.

BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynesian	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890.....	22,576	820									
1891.....	22,749	22,777	68								
1892.....	22,749	22,801	23,274	7,753							
1893.....	22,793	22,781	22,762	22,749							
1894.....	22,813	22,789	22,858	22,813	12,567						
1895.....	22,891	22,922	22,913	22,936	13,629	9,571					
1896.....	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897.....	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898.....	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899.....	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total.....	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE, ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

CANADIAN SHIP BUILDING NOTES.

Graham, Horne & Co., Lindsay, Ont., will build two new tugs this winter to replace the present Aikens and Mary Ann. They will be built of British Columbia fir.

W. L. Lovitt, I. M. Lovitt and L. Chipman, Yarmouth, N. S., are applying for incorporation as the Brookside Shipping Co., Ltd.; head office, Yarmouth, N. S.; capital stock, \$30,000.

The Central Pacific Railway Co. have prepared plans for a new steamer which will be built this winter to run on the route between the Nelson and Kootenay landing in connection with the Crow's Nest Pass railway. It is said the steamer will be superior to the Rossland, which plies on the Arrow lakes between Arrowhead and Rossland.

H. H. Gildersleeve, manager of the Lake Ontario and Bay of Quinte Navigation Co., is having plans and specifications prepared for a new steamer to be built this winter at Kingston, Ont. He has also been inspecting the steamer John Endicott, at Boston, with a view of purchasing it for the Bay of Quinte route next season.

The steamer Turret Bell, which went ashore at Bryon island, Magdalen islands, in July last, has been repaired at Halifax at a cost of \$50,000, and will now resume her trips at Sydney, B. C.

McLeod and White, Welland, Ont., propose to build a new tug. It will have a triple expansion compound 22x24 engine, and its hull will be 70 ft. long.

The Dominion government is arranging for the building of a new steamer to take the place of the wrecked Newfield. She will be adapted for light-house supply service, and will be fitted with cabling gear. It will be much larger than the Newfield, and is expected to be ready for spring service.

T. B. Bowring, of the great London, Liverpool and New York shipping concern, has lately been visiting the Dominion Coal and Dominion

Iron & Steel Co.'s properties at Glace Bay, Louisburg and Sydney, and it is said, has engaged to construct three large modern steamers of 6,000 tons for the Cape Breton coal carrying trade. The names of the steamers are to be Mira, Mystic and Melville, the latter to be christened in honor of H. Melville Whitney.

J. H. Rushton of Canton, N. Y., boat builder, is fairly rushed with orders for small boats, such as canoes, rowboats and launches. During the past season he has manufactured 260 boats and has been unable to care for several orders.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland,
date of November 15, 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	44	45	44	44 1/2
American Steel & Wire, Pfd.....	85	86	85	85 1/2
Federal Steel	48 1/2	49	48 1/2	48 1/2
Federal Steel, Pfd.....	75 1/4	75 1/4	74 1/2	75 1/4
National Steel	37 1/4	37 1/2	36	36
National Steel, Pfd.....	92 1/4	.....	.....	92 1/4
American Tin Plate	41	41 1/4	40	40 1/4
American Tin Plate, Pfd.....	.....	.....	.....	.....
American Steel Hoop.....	31 1/2	31 1/2	31	31
American Steel Hoop, Pfd.....	.....	.....	.....	.....
Republic Iron & Steel	17	17 1/2	16 1/2	17
Republic Iron & Steel, Pfd.....	63 1/2	64	63 1/2	64 1/2

PASSENGER AND FREIGHT STEAMER WANTED.

Must have suitable night accommodations for at least 75 passengers, and freight capacity of not less than 300 tons, on draft not exceeding 13 feet. Address No. 400, the Marine Review Pub. Co., Perry-Payne Bldg., Cleveland, O.

Dec. 6

FOR SALE.

Five electric passenger launches in fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago.

THE FLUSHOMETER THE KENNEY SYSTEM.

FOR FLUSHING WATER-CLOSETS.

[Patented.]

The best system ever invented for use on steam vessels.
No Cup Leathers or Springs.

Owners and Constructors of Steamships, Yachts and
Steamboats have found it indispensable.

Used by the U. S. War and Navy Departments—
Transports Grant, Sheridan, Burnside, Terry, Logan,
Hooker, Thomas, Sherman and others. Also Al-
bany Day Line Steamers. Norfolk & Washington S. S. Line, Steam Yachts
Neaira, Aphrodite and
Loando, and new Lake
Steamers Illinois, Penn-
sylvania, Angeline, etc.

FLUSHOMETER TRADE MARK

Send for Catalogue.

THE KENNEY CO., 72-74 Trinity Place, NEW YORK.

BARGAINS IN BOOKS.

AS LEADERS IN OUR BOOK TRADE WE WILL
ALLOW FOR THIRTY DAYS A DISCOUNT OF 25
PER CENT ON THE FOLLOWING BOOKS LISTED
ON PAGE 35 OF THIS ISSUE OF THE REVIEW:

Practical Advice for Marine Engineers—Roberts.
A Library of Steam Engineering—Fehrenbach.
Gas and Oil Engines—Richmond.
Slide Valves—MacCord, Jr.
A Handbook of Engineering Practice—Smart.
Modern Examinations of Steam Engineers—Wakeman.
Theoretical and Practical Ammonia Refrigeration—Redwood.
Elementary Naval Tactics—Bainbridge-Hoff.
Screw Propellers and Marine Propulsion—Chase.

THE MARINE REVIEW PUB. CO., CLEVELAND, O.



ONE OF THESE BINDERS

that will hold 52
NUMBERS
of the

MARINE REVIEW,

Will be mailed to
any address or
receipt of \$1.

MARINE REVIEW...

Perry-Payne Bldg.,
CLEVELAND, O.

CAPT. GEO. A. SIMPSON, Expert Compass Adjuster,
19 YEARS EXPERIENCE
Yearly Contracts Solicited. Nautical Instruments Repaired.
OLD PHONE No 319. SAULT STE. MARIE, MICH.

Blue Book of American Shipping.

STANDARD MARINE AND NAVAL DIRECTORY OF THE UNITED STATES.

ONLY PUBLICATION OF ITS KIND IN AMERICA.

Particulars of all vessels of the United States and Canada with names and addresses of owners.
A directory of steamship lines with names of purchasing agents and chief engineers.
Contains in 500 pages information on shipping subjects collected in the office of the Marine Review during ten years past.

Lists of ship and engine builders, dry docks, naval architects, marine engineers, ship masters, dredging concerns, iron mining companies, etc.

ONLY RELIABLE COMPILATION OF SHIPPING STATISTICS.

BEAUTIFULLY ILLUSTRATED AND SPLENDIDLY PRINTED THROUGHOUT.

1900 EDITION REVISED, ENLARGED AND IMPROVED.

PRICE, \$5.00.

THE MARINE REVIEW PUB. CO., Cleveland, O.



ABSOLUTELY FLAWLESS

Shelby Cold Drawn Seamless Steel Boiler Tubes are made from the very best quality of open hearth steel and are worked cold after the heating operations.

This method of manufacture produces a tube ABSOLUTELY FLAWLESS.

Shelby Boiler Tubes contain no laps, seams, or blow holes and are very dense, tough and ductile.

No dirt rolled into surface as will frequently be found in lapwelded tubes.

Shelby Boiler Tubes do not crack nor fail at the ends. Shelby Tubes do not leak.

Cold Drawn Seamless Steel Tubing is specified by the U. S. Government for all U. S. Navy Boilers.

Write for new catalogue for full information.

SHELBY STEEL TUBE CO. CLEVELAND, O.
GENERAL SALES OFFICE ~ AMERICAN TRUST BLDG.

BRANCH OFFICES: NEW YORK | JULIAN L. YALE & CO.
CHICAGO 135 LAKE ST. ROOKERY BLDG CHICAGO

J. J. LYNN
PORT HURON, MICH.

BURRELL & FOWLER - CLEV'D O.

Dearborn Vegetable Boiler Compounds.

SCIENTIFICALLY AND UNIFORMLY MADE. EVER RELIABLE.

Most Scientifically equipped, Complete, Handsome and expensively Furnished Laboratories, and the ONLY EXCLUSIVE LABORATORIES ON STEAM ECONOMY in the Country.

MARINE FORMULA NO. 5, For the WATERS of the FIVE LAKES.

To prevent pitting, neutralize the oil, stop incrustation, and as a perfect preservative to the iron, boiler, and all its connections—especially prepared for the marine trade of the lakes.

If you are using a different water, prepay the express on a gallon jug of your feed water to the DEARBORN LABORATORIES at CHICAGO and receive a copy of analysis of same, with a written diagnosis of your case, and a letter giving you all the valuable information we can, and the actual cost of what it will require to clean your boilers and keep them clean. All of this will be done free of charge, and optional with you whether you order or not. When in Chicago call and inspect our Laboratories.

Analyzers of Everything.

Makers of Boiler Compounds.

DEARBORN DRUG & CHEMICAL WORKS

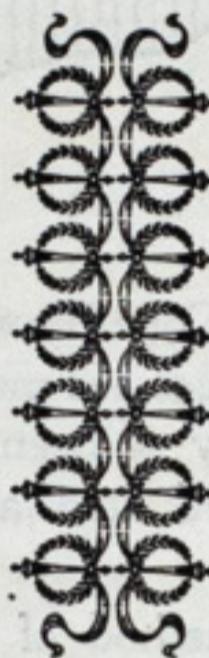
W.M. H. EDGAR, President.

Manufacturing and Analytical Chemists.

CHICAGO

OFFICES: 29, 30, 31, 32 and 33 Rialto Building. Telephone, Harrison, 1373.

WORKS: 23, 25, 27 and 29 La Salle Street. Telephone No. 1130 South.



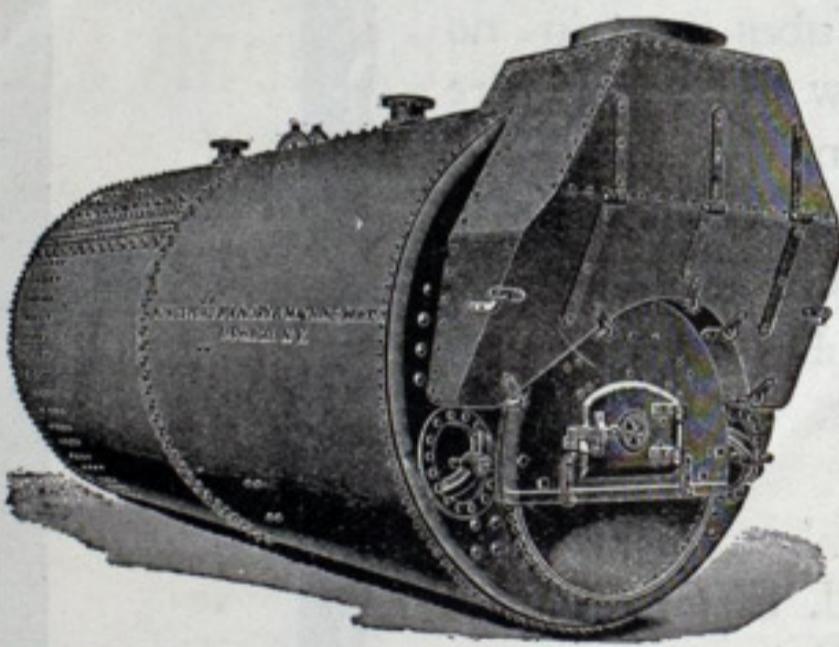
CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,

METAL & WOODEN SHIP BUILDERS.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships
A SPECIALTY.



Marine Boilers.

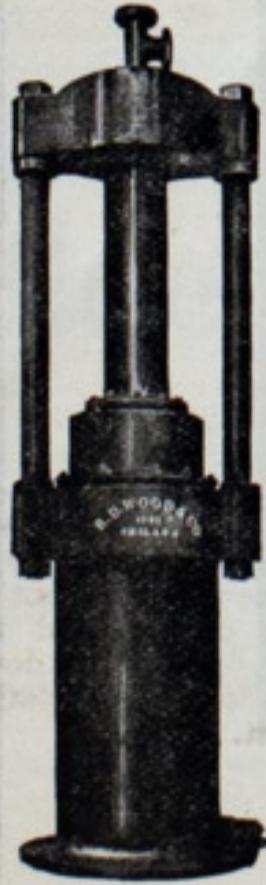
Centrifugal Pumping
Machinery for all
Purposes.

Kingsford Foundry
and Machine Works,
OSWEGO, N. Y.

R. D. WOOD & CO.

400 Chestnut Street,
PHILADELPHIA, PA.

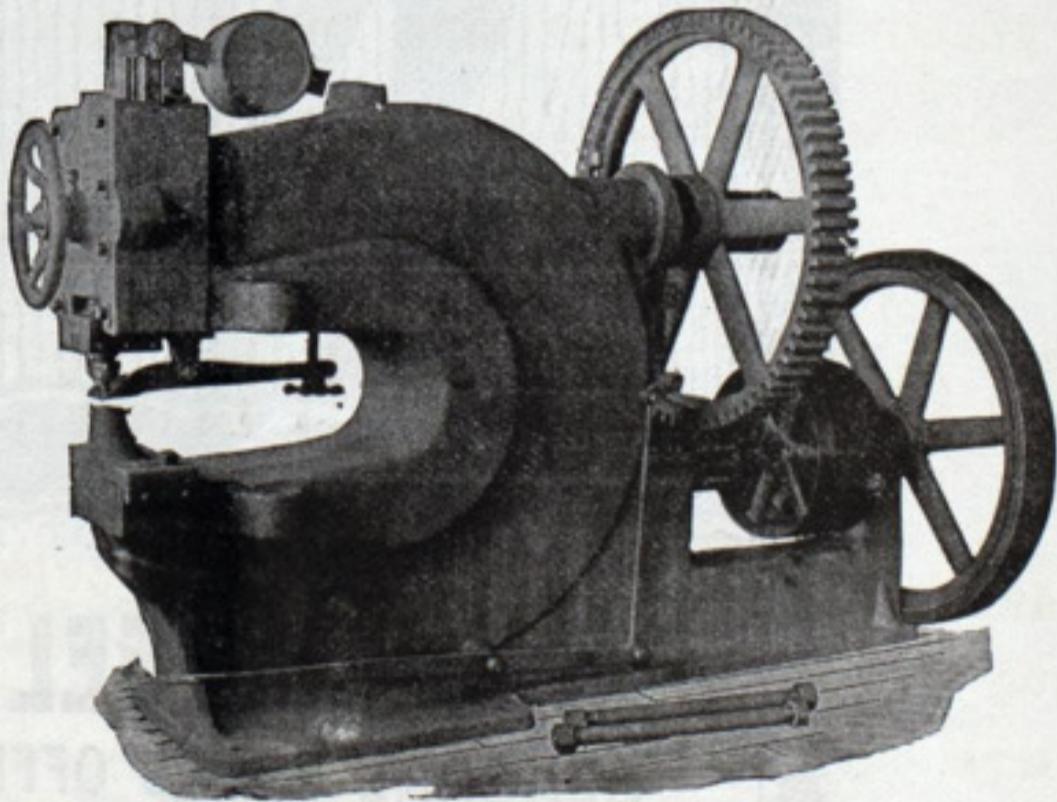
Hydraulic Riveters, Shears,
Intensifiers, Presses, Valves,
Lifts, Etc. ♦ ♦ ♦ ♦ ♦ ♦ ♦
Producer Plants with Bildt
Feed for operating Gas En-
gines, and for Metallurgical
and other uses.



LARGE LOAM CASTINGS,
SUGAR HOUSE WORK, GAS
AND WATER APPLIANCES.

20 YEARS

Of Satisfactory Service



in the largest shops all over the world demonstrate
the superiority of our "CLEVELAND" Tools for
Ship Builders, Boiler Makers and Iron Workers.

QUALITY THE HIGHEST. PRICES RIGHT.

The Cleveland Punch & Shear Works Co.,

CLEVELAND, O., U. S. A.

MARINE VALVE,
MINERAL SEAL

DARK LUBRICATING,
ELDORADO ENGINE

REOWN ENGINE,
HEAD LIGHT

VICTOR SIGNAL,
LARD OILS

MARINE VALVE OIL
FOR
INTERNAL LUBRICATION.

— AND —
ARCTIC CUP GREASES

CARRIED IN STOCK BY THE

STANDARD OIL COMPANY,

5 WABASH AVENUE, CHICAGO, and 123 RIVER STREET, CLEVELAND.

REOWN ENGINE OIL
FOR
EXTERNAL LUBRICATION

ALSO FOR SALE BY

STANDARD OIL COMPANY,

Muskegon, Mich. Manistee, Mich.
Racine, Wis. Manitowoc, Wis.
Milwaukee, Wis. Green Bay, Wis.
Sheboygan, Wis. Buffalo, N. Y.

ATLANTIC REFINING CO., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HENRY HULL, Lorain, O.
LAKE ERIE SUPPLY CO., Conneaut, O.

Ludington, Mich. St. Ignace, Mich.
West Bay City, Mich. Ashland, Wis.
Detroit, Mich. Kenosha, Wis.
Escanaba, Mich.

BABY & DALE, St. Clair, Mich.
N. C. ALLEN, Lorain, O.
A. F. HARRINGTON, Conneaut, O.
CHAPMAN & HILLS, Lorain, O.
HARBOR SUPPLY CO., Ashtabula, O.

Marinette, Wis.
Oshkosh, Wis.
Duluth, Minn.

West Superior, Wis.
Hancock, Mich.
Marquette, Mich.

Sault Ste. Marie, Mich.
Saginaw, Mich.

SCOTT BROS., & DELISLE, Marine City, Mich.
MARINE SUPPLY CO., Fairport, O.
THE M. I. WILCOX CO., Toledo, O.
SO. CHICAGO SHIP CHANDLERY CO., So. Chicago

Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for Channel and Harbor Lighting; over 1000 gas buoys and gas beacons in service.

Burn Continuously

from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

Brilliant and Steady Illumination.

Economical and Reliable in Operation.

Controlled by the SAFETY CAR HEATING AND LIGHTING CO.,
160 Broadway, New York City.

Navigators' Charts.

CHARTS OF ALL PARTS OF THE WORLD

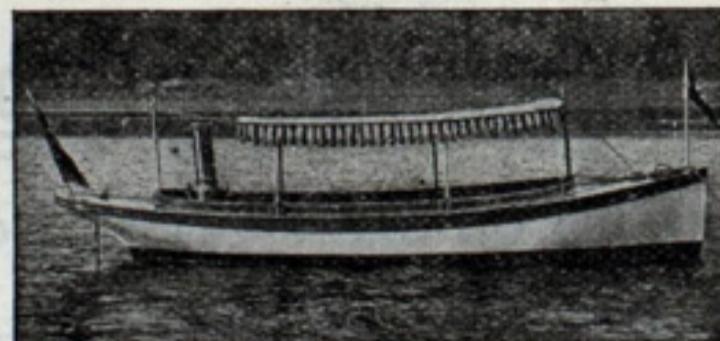
KEPT IN STOCK BY

THE MARINE REVIEW PUBLISHING CO. OF CLEVELAND,

AGENT FOR THE UNITED STATES HYDROGRAPHIC OFFICE.

THE ONLY NAPHTHA LAUNCH.

NEARLY
3,000
IN USE.



The
Safest,
Simplest,
Speediest
power
boat.

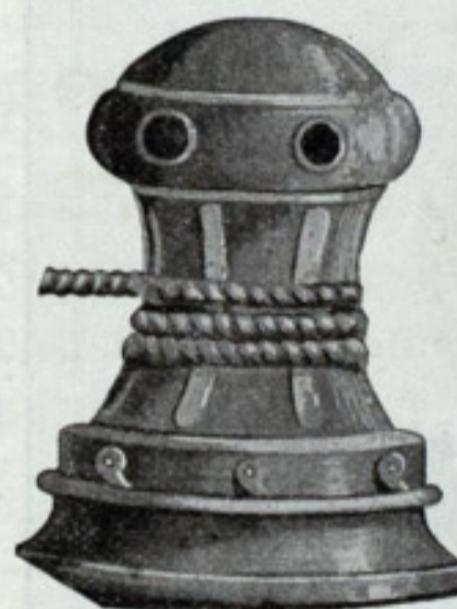
Superiority demonstrated by ten years' experience.

STEAM AND SAIL YACHTS.
MARINE ENGINES AND "SEABURY"
WATER TUBE BOILERS.

GAS ENGINE & POWER CO., AND
CHARLES L. SEABURY & CO., Consolidated.

Morris Heights, New York City.

SEND IOC. STAMP FOR CATALOGUE.



The Marine Supply Co.

FAIRPORT HARBOR, O.

W. J. SYMONS, MGR.

GENERAL PURVEYORS TO VESSELS.

Stewards' Supplies, Mates' Supplies
and Engineers' Supplies.

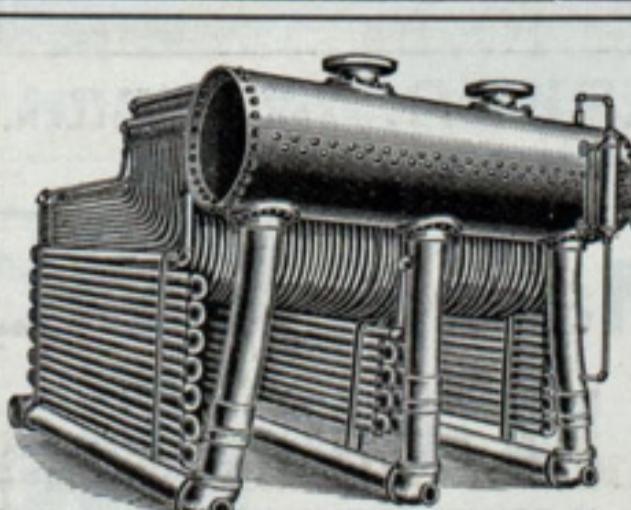
SHIP CHANDLERS.

The only store in Fairport Harbor
that has everything a vessel needs.

TELEPHONE SERVICE.

Call on us to supply anything or to per-
form any service for you.

M. W. Fogg, MANUFACTURER OF
HAIR AND FELT
MATTRESSES, CUSHIONS
AND BEDDING.



Perspective view of the 250 H. P. boiler built
for steamboat Clara, having 6 feet face and 8
feet length; 37.5 square feet of grate area and
1900 square feet heating surface. Weight of
boiler and water, 14,000 lbs.

WE CLAIM for the Boyer Sec-
tional Water Tube Boilers,
that they are of an entirely
new design, are simplest in
construction, are accessible to all
parts, are rapid steamers with
short circulation, have low center
of gravity, have no joints in the
fire, have no dead ends, occupy
less space in width, length and
height than any other, are easily
fired, can be repaired or set up by
any ordinary mechanic, do not re-
quire a brick casing, and are
shipped whole or knocked down
into packages for transportation
by man or beast.

The Boyer Water Tube Boiler Co.,
90 Wall Street, NEW YORK.

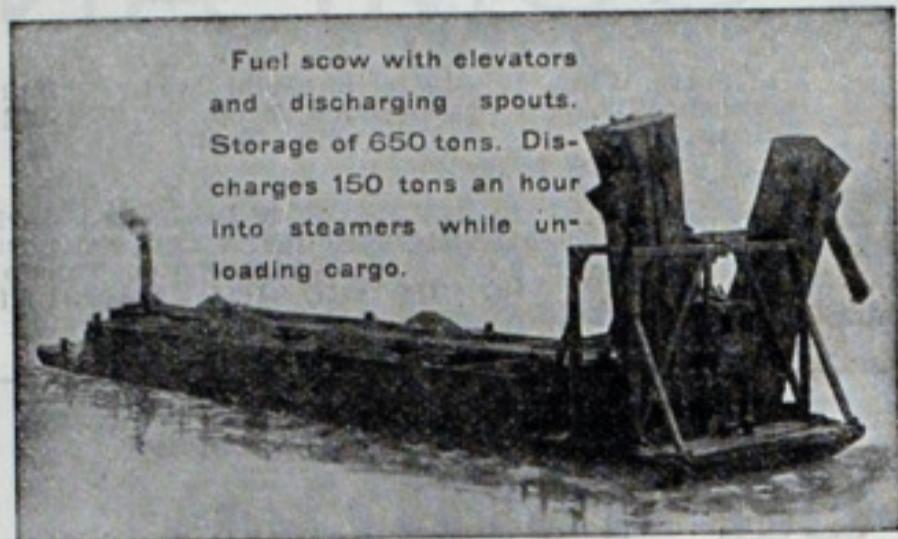
MENTION THIS PAPER.

GEORGE STRATFORD OAKUM CO.,
MANUFACTURERS OF
Oakum, Plumbers' Spun and Marine Oakum and Spun Cotton.
OFFICE AND FACTORY:
CORNELISON AVENUE, JERSEY CITY, N. J.

Steamboat Fuel at Ashtabula. LARGE SUPPLIES OF
BEST QUALITY.

Lighter

**Carrying
Different
Grades
at all
Times.**



M. A. HANNA & CO., Miners and Shippers.
Main Office, Perry-Payne Bldg., Cleveland

THE Swain Wrecking Co. L. C. WALDO, Pres.

The TUG FAVORITE STATIONED AT CHEBOYGAN MICH. WITH COMPLETE WRECKING OUTFIT IN CHARGE OF Capt. Martin Swain.

THE CANADIAN WRECKER SAGINAW STATIONED AT DETROIT, MICH. ENABLES US TO WRECK IN CANADIAN WATERS.

STEAM PUMPS AND SUB-MARINE WORK IN CHARGE OF JOHN S. QUINN.

PARKER & MILLEN OFFICE AT 15 ATWATER ST. WEST. DETROIT, MICH.

4 STEAM PUMPS, 10 JACKS, 3 HAWSERS.

NOVEMBER

S	M	T	W	T	F	S
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	...

10-100 TON JACKS:
1-12 INCH HAWSER
1-10
1-9

TELEGRAPH

Capt. MARTIN SWAIN,
CHEBOYGAN,
MICH.

A. A. & B. W. PARKER, SUCCESSORS TO
PARKER & MILLEN,
DETROIT, MICH.

Pickands, Mather & Co.,



Western Reserve Building, CLEVELAND, O.

FUEL LIGHTERS AT BUFFALO,
ERIE,
ASHTABULA
AND CLEVELAND.

AT DETROIT, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any time during Day or Night.

MARINE FIRE BOX BOILER FOR SALE.

10 ft. long, 7 ft. 11 in. in height, 7 ft. 10 in. in width. Steam dome 42 in. diameter by 54 in. Two furnaces, 20 sq. ft. of grate surface each 124 tubes, 3 in. x 7 ft. 1 in. Boiler as good as new with entire new furnaces and new tubes, and has breeching, grate bars, ash pans and stands. Will warrant the boiler to pass United States inspection for marine service at 100 lbs. working pressure. Price, f. o. b. steamer or cars, \$1,600. The Johnson Iron Works, Limited, P. O. Drawer No. 241, New Orleans, La.

Dec. 6

PASSENGER STEAMER FOR SALE.

Length over all, 177 ft.; beam on water line, 29 ft.; beam on deck (concaved) 40 ft. Rebuilt in 1893. Carries 500 tons freight. Allowed 500 passengers; will sleep 120 and can be made to sleep 200. Good cabin outfit. Steeple compound engines, double fire-box boiler. Speed, 11½ miles. Reason for selling is that vessel is not speedy enough for present service. Address Passenger Steamer,

tf THE MARINE REVIEW PUB. CO.,
Cleveland.

Sealed proposals will be received at the office of the Light-House Engineer, Buffalo, N. Y., until 12 o'clock M., December 15, 1900, and then opened, for constructing two beacons with lanterns and a fog-signal house, including foundations and protection work in the main south entrance of the new breakwater at Buffalo, N. Y., in accordance with specifications, copies of which with blank forms of proposal and other information may be had upon application to this office. T. W. Symons, Major, Corps of Engineers, U. S. A.

Nov. 15.

The Erie & Western Transportation Co. ANCHOR LINE. 1900.

Passenger Service—

Steamers..... India, China, Japan.
Ports of call... Buffalo, Sault Ste. Marie, Hancock, Marquette, Cleveland, Detroit, Mackinac Island, Port Huron, Duluth, Houghton.

Freight Service—
Steamers..... Alaska, Delaware, Codorus, Mahoning, Susquehanna, Schuylkill, Lycoming, Conestoga, Clarion, Wissahickon, Conemaugh, Juniata, Lehigh,
Ports of call... Buffalo, Erie, Cleveland, Marquette, Detroit, W. Superior, Hancock, Duluth, Houghton, Sault Ste. Marie, Chicago, Milwaukee.

CHAS. E. MARKHAN, Gen. Pass. Agt., E. T. EVANS, Western Manager, Buffalo, N. Y. Buffalo, N. Y.

THE DONNELLY SALVAGE AND WRECKING CO., Ltd

JOHN DONNELLY, Sr., Pres.
JOHN DONNELLY, Jr., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

KINGSTON ONT.

Divers, Steam Pumps, Tugs, Etc

SUPPLIED ON SHORTEST NOTICE.

The Bessemer Steamship Company

Solicits Catalogues, Prices and Discounts from manufacturers and wholesale dealers in Ship Machinery, Brass Goods, Rope, Paints, Asbestos, Packing, Hose, Furniture, Piping, Glass and Crockery, Tinware, Ranges, Carpeting, Bedding, Life-preservers, Rafts and Boats, Engineers' Supplies and Tools, Carpenters' Tools, Electric Supplies, Lamps, Grate Bars, Castings, etc., etc., etc.

ALSO QUOTATIONS from Market men and Grocers on the Lakes for Provisions and Meat, best quality only.

CATALOGUES without quotations are not wanted.

ALL GOODS except provisions to be delivered in Cleveland.

Address L. M. BOWERS, General Manager,
CLEVELAND, OHIO.

CASTNER, CURRAN & BULLITT, SOLE AGENTS FOR POCAHONTAS SMOKELESS SEMI-BITUMINOUS COAL

THE BEST STEAM COAL IN THE WORLD.

Officially endorsed by Great Britain and United States. Standard Fuel of United States Navy.
Used exclusively on Cunard, White Star and other Transatlantic Lines.

Main Office, 328 Chestnut Street

PHILADELPHIA PA.

BRANCH OFFICES:

1 Broadway, New York.

Old Colony Building, Chicago, Ills.

Terry Building, Roanoke, Virginia.

Citizens Bank Building, Norfolk, Va.

70 Kilby Street, Boston, Mass.

Neave Building, Cincinnati, Ohio.

Calle Reconquista 399, Buenos Ayres, Argentine Republic, South America.

4 Fenchurch Avenue, London, England.

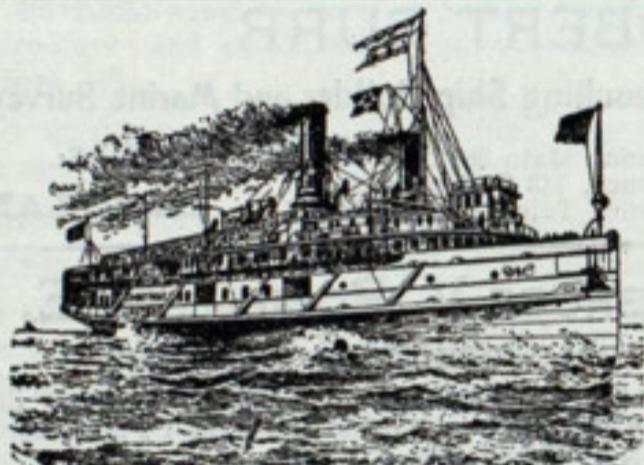
PITTSBURG COAL CO.

Steamboat Fueling Facilities at various points on the Great Lakes:

Cleveland Harbor { 4 Car Dumpers. 3 Lighters.	Fairport Harbor { 1 Car Dumper. 1 Lighter.	Ashtabula Harbor { 1 Car Dumper. 1 Lighter.	Erie Harbor { 1 Car Dumper. Fuel Pockets.
Detroit River Branch { Docks and Pockets at Sandwich and Amherstburg.		Sault River Branches { Dock and Pockets at Detour. Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)	

WE FURNISH ONLY
THE BEST GRADE OF **PITTSBURG and YOUGHIOGHENY COAL.**

General Office, Lake Department, Perry-Payne Building, Cleveland, O.



SHIPERS OF COAL BY RAIL AND WATER.

RAPID FUELING DOCKS, DETROIT RIVER JAMES GRAHAM & CO.,

Foot Twenty-first St., Detroit.

Below Wabash Elevator

POCKETS AND CHUTES ARRANGED FOR DIFFERENT TYPES OF VESSELS.

BEST STEAM COAL.

Large Supplies of car coal, and every effort to give dispatch day and night.
Wide stretch of river for tows, and plenty of water at dock at all times.

Dock Telephone, W. 328.

Long distance Telephone 2083.

Office 1008-9 Chamber of Commerce.

STEAMBOAT FUEL AT CHICAGO.



Youghiogheny and Lehigh Coal Co.

J. T. CONNERY, ARCHIE J. HITCHCOCK,
Manager. Dock Sup't.

No. 1, Michigan Slip and Basin.
'Phone 3046, Main.

No. 2, N. Halsted St. Bridge. 'Phone 773 North.
Equipped with 125 2-ton Buckets for Fuel-

ing Anywhere in Harbor.

MAIN OFFICE: 1238-1242 Chicago Stock Exchange Building.

Long Distance Telephone, Main 5049.

110 LA SALLE STREET.

FUEL DOCKS:

No. 1, Michigan Slip and Basin.
'Phone 3046, Main.

No. 2, N. Halsted St. Bridge. 'Phone 773 North.
Equipped with 125 2-ton Buckets for Fuel-

ing Anywhere in Harbor.

The Rochester & Pittsburgh Coal & Iron Co.

REYNOLDSVILLE COAL.

STEAMBOAT FUEL DOCK—Blackwell Canal at Michigan St.
Bridge. 1400 feet of dock frontage. Hulett Car Dumping
Machine, Steam Fuel Scow of 55 tons capacity.
Boats coaled day or night.

OFFICE: 684-88 ELLICOTT SQUARE, BUFFALO, N.Y.

TELEPHONE, Seneca 1154.

E. McQ. DUTHIE,
Cargo and Fuel Agent.



STANLEY B. SMITH & CO.

DETROIT, MICH.

SHIPERS
OF

COAL

OPERATING

BY
RAIL AND LAKE

SMITH'S COAL DOCK, Detroit River.

VESSEL AND INSURANCE AGENTS.

C. W. ELPHICKE & CO.

Vessel and Insurance Agents,
Room 10, No. 6 Sherman St.,
C. W. ELPHICKE.
CALVIN KARR.
Long Distance Telephone, Harrison 1194.

CHICAGO, ILL.

MITCHELL & CO.

Vessel and Insurance Agents,
508, 509 & 510 Perry-Payne Bldg.
Office Telephone M 767.
Residence, John Mitchell, Doan 341.
John F. Wedow, Doan 158 L.
Alfred Mitchell, Doan 218.

JOHN MITCHELL.
JOHN F. WEDOW.
ALFRED MITCHELL.

F. H. OSBORN & CO.

Marine Insurance Brokers,
12 Sherman Street,
Long Distance Telephone,
Harrison 1586.

CHICAGO.

D. T. HELM & CO.

Vessel Agents,
TRANSPORTATION.
MARINE INSURANCE.
Board of Trade,
DULUTH, MINN.

W. C. RICHARDSON,

Vessel and Marine Insurance Agent,
420-421 Perry-Payne Building,
Office Telephone 338.
Residence Telephone 2938.

CLEVELAND, O.

BROWN & CO.

Vessel and Insurance Agents,
202 Main Street,
BUFFALO, N. Y.

H. J. PAULY,

General Ship Broker,
59 Chamber of Commerce,
Telephone Main 369.

MILWAUKEE, WIS.

J. G. KEITH & CO.

Vessel and Insurance Agents,
138-139 Rialto Building,
Long Distance Telephone, Harrison, 1339.

CHICAGO.

GIBBS & JOYS,

Successors to R. P. Fitzgerald & Co.
Vessel Agents, Fire, Marine, Ocean and
Surveyors and Adjusters, Liability Insurance.
No. 11 Chamber of Commerce,
Telephone Main 142.

ALBERT GIBBS.
CARL C. JOYS.

MILWAUKEE.

HALL & ROOT,

Vessel Agents,
21-22 Exchange Building, 202 Main St.,
Telephone Seneca 892.

BUFFALO, N. Y.

DRAKE & MAYTHAM,

Vessel Agents,
M. M. DRAKE.
202 Main Street,
Telephone Seneca 1660.

BUFFALO, N. Y.

HUTCHINSON & CO.

Vessel and Insurance Agents,
Office Telephone, Main 2453.
Residence C. L. Hutchinson, W. 697L.
Residence W. H. McGean, E. 198J.
313-315 Perry-Payne Bldg.,

CLEVELAND, O.

JOHN J. BOLAND,

Vessel and Insurance Agent,
25-26 Exchange Bldg., 202 Main St.,
Telephone Seneca 115.

BUFFALO, N. Y.

VESSEL AND INSURANCE AGENTS.

SAMUEL HOLMES,

Steamship Offices,
For Selling, Chartering and Building
all classes Steam Vessels.
Steam Vessel Circulars.
Weekly Freight Circulars.

Morris Building,

66-68 Broad St.,

NEW YORK.

MOFFAT & O'BRIEN,

General Shipping, Transfer of Vessel
Property a Specialty.
A. N. MOFFAT.
CHAS. S. KING.
RUSSELL G. O'BRIEN.

Foot of Mission St., Pier 2,

and 409 Examiner Building,

SAN FRANCISCO.

HAWGOOD & MOORE,

Vessel and Insurance Agents,
W. A. HAWGOOD.
J. W. MOORE.
Long Distance Tel. 2395.
Residence Phone, Doan 446—W. A. Hawgood.

Perry-Payne Building,

CLEVELAND, O.

THOS. WILSON, Managing Owner

WILSON'S TRANSIT LINE,
General Forwarder.
Freight and Vessel Agent.

CLEVELAND, O.

The Blue Book of American Shipping

may be had on approval. We will pay ex-
press charges for its return if it is not what is
wanted. THE MARINE REVIEW PUB. CO.,
Perry-Payne Building, Cleveland.

PROCTORS IN ADMIRALTY.

STOWE & GRAYDON,
Lawyers and Proctors in Admiralty,
WILLIAM E. STOWE.
THOMAS J. GRAYDON.

204 Dearborn Street,

Suite 806 Marquette Building.
Telephone Central 1225.

CHICAGO.

HOYT, DUSTIN & KELLEY,

Lawyers and Proctors in Admiralty,
Offices, 702 Western Reserve Building,
CLEVELAND, O.

RAY G. MACDONALD,

Attorney at Law and Proctor in Admiralty,
Suite 618 New York Life Building,
Telephone Central 723.

CHICAGO, ILL.

White, Johnson, McCaslin & Cannon,

ATTORNEYS AT LAW and
PROCTORS IN ADMIRALTY,

Williamson Building,

CLEVELAND, O.

GOULDER, HOLDING & MASTEN,
LAW OFFICES,

HARVEY D. GOULDER.
S. H. HOLDING.
FRANK S. MASTEN.

Perry-Payne Building,

CLEVELAND, O.

ALBERT J. GILCHRIST,
PROCTOR IN ADMIRALTY,

604 Perry-Payne Building,
CLEVELAND, O.

SAMUEL H. CROWL,

Attorney at Law and Proctor in Admiralty,
505 American Trust Building,
Phone Main 3579.

CLEVELAND, O.

ORESTES C. PINNEY,

Lawyer and Proctor in Admiralty,
Rooms 316 and 317 Perry-Payne Building,
Telephone Main 2585.

CLEVELAND, O.

PROFESSIONAL.

W. J. WOOD,

Naval Architect,
Ship Surveyor.
Consulting Engineer.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs.

Vessels designed—Twin S. S. Virginia, Steam Yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.

COMPLETE PLANS FURNISHED FOR
STEEL COMPOSITE OR WOODEN VESSELS

Office on Goodrich Dock,
foot of Michigan Avenue, CHICAGO, ILL.

Pittsburgh Testing Laboratory, Ltd.,

INSPECTING AND METALLURGICAL
ENGINEERS AND CHEMISTS,

1750 Monadnock,
CHICAGO.

325 Water Street,

PITTSBURGH.

906-7 Crozier Building, Philadelphia.

New York City, 60 New Street.

Richmond, Va., 1107½ Main Street.

Inspectors of Shipbuilding Materials and Machinery.
Inspectors located at all mills, Physical and Chemical Laboratories. Tests of all kinds.

ROBERT W. HUNT & CO.

Bureau of Inspection, Tests and Consultation.

1121 The Rookery, Chicago.

Monong. Bank Bldg., Pittsburgh.

71 Broadway, New York.

Inspectors of Shipbuilding Material and Machinery. Inspectors of all Materials. Duty Tests of Engines and Boilers. Physical and Chemical Laboratories.

HORACE SEE,

CONSULTING ENGINEER
AND NAVAL ARCHITECT,

No. 1 Broadway,

NEW YORK

ROBERT CURR,

Consulting Ship Builder and Marine Surveyor,

Telephone Main 2844. 56 Wade Building,
Residence, 133 Salisbury Ave.
Residence Telephone, W. 428M.

CLEVELAND, O.

AMBROSE V. POWELL, C. E.

Consulting Engineer.

SPECIALTIES:—Designing and Construction of DRY DOCKS, Harbor Works, Docks and Plants for Handling Coal and Ore.

Office, 615 Chamber of Commerce, CHICAGO, ILL.

PATENTS.

THURSTON & BATES,

Counselors at Law in Patent Causes
and Solicitors of Patents,

1028 Society for Savings Bldg.,

E. L. THURSTON.

CLEVELAND, O.

HERBERT WRIGHT & CO.,

No. 215, 216, 217, 218 and 219

PERRY-PAYNE BUILDING.

Telephones Main 2754, 2770 and 3541.

Up-town Office,

No. 811 NEW ENGLAND BUILDING.

Telephone Main 1273.

Every possible facility for conducting a
brokerage business in

STOCKS, BONDS, GRAIN, ETC.

Navigators' Charts!

THE MARINE REVIEW HAS THEM.

Charts of the Whole World.

Books on Naval Architecture,

NAVAL ARCHITECTURE: A MANUAL ON LAYING OFF IRON AND STEEL VESSELS—Thos. H. Watson. Valuable for naval architects as well as beginners in ship yards. \$5.

NAVAL ARCHITECT'S AND SHIPBUILDER'S POCKET BOOK—Clement Mackrow. Formulae, rules and tables, and marine engineers' and surveyors' Handy Book of Reference. Seventh edition. 700 pages; pocket-book form. \$5.

PRACTICAL INFORMATION ON THE DEVIATION OF THE COMPASS, for the use of Masters and Mates of Iron Ships—J. T. Towson. \$2.

CLOWE'S NAVAL POCKETBOOK. \$2. Containing valuable information concerning all navies of the world.

SELF-INSTRUCTION IN THE PRACTICE AND THEORY OF NAVIGATION—Earl of Dunraven. Two Volumes—\$7.

THEORETICAL NAVAL ARCHITECTURE—E. L. Atwood. Text book; 114 diagrams. \$2.50.

ELEMENTS OF NAVIGATION—Henderson. \$1.

SIMPLE ELEMENTS OF NAVIGATION—Young. New second edition, \$2; a few copies of the first edition at \$1.

NAVIGATION AND NAUTICAL ASTRONOMY—Prof. J. H. C. Coffin. \$3.50.

KNOW YOUR OWN SHIP—Thos. Walton. \$2.50.

PRACTICAL MARINE SURVEYING—Harry Phelps. \$2.50.

SHIPBUILDING: THEORETICAL AND PRACTICAL—Rankins and Barnes. \$40. This book is now very scarce.

RESISTANCE AND PROPULSION OF SHIPS—By Taylor. \$3.75.

NAVAL ARCHITECTURE—J. J. Welch. New edition. Out soon.

STABILITY OF SHIPS—Sir E. J. Reed. \$8.40.

NAVAL SCIENCE—Sir E. J. Reed. Complete set of four volumes; half morocco. \$20.

STEAM YACHTS AND LAUNCHES—By Kuhnhardt. \$3.

MODEL ENGINES AND SMALL BOATS—N. M. Hopkins. New methods of engine and boiler making; ship design and construction; fifty illustrations. \$1.25.

TEXT BOOK OF SEAMANSHIP—Com. S. B. Luce, U. S. N. Equipping and handling of vessels under sail or steam. \$10.

HINTS ON LEGAL DUTIES OF SHIPMASTERS—B. W. Ginsburg. \$1.75.

SUBMARINE BOATS—By Hovguard. \$2.

NAVAL ARCHITECTURE—Sir W. H. White. New Edition. 750 pages. \$9.

SCOTT'S COAST PILOT FOR THE GREAT LAKES. \$1.50.

GEORGIAN BAY AND NORTH CHANNEL PILOT—Department of Marine and Fisheries, Canada.

THE AMERICAN PRACTICAL NAVIGATOR—Nathaniel Bowditch. \$2.25.

BOWDITCH'S USEFUL TABLES. \$1.25.

PROJECTION TABLES—Bureau of Navigation. \$1.50.

AZIMUTH TABLES for the Great Lakes—Hydrographic Office. 50 cents.

SHIP YARD PRACTICE, SEAMANSHIP, Etc.

INTERNATIONAL SIGNAL CODE—Bureau of Navigation. \$2.50.

ELEMENTARY NAVAL TACTICS—Com. Wm. Bainbridge-Hoff, U. S. N. \$2.

SCREW PROPELLERS AND MARINE PROPULSION—I. McKim Chase. \$2.50.

FROM KEEL TO TRUCK—H. Paasch. Marine dictionary in English, French and German; illustrated. \$5.

A MANUAL OF ALGEBRA—R. C. Buck. For the use, more especially, of young sailors and officers in the merchant navy; numerous examples and exercises. \$1.50.

TABLES FOR FINDING THE DISTANCE OF AN OBJECT BY TWO BEARINGS—Hydrographic Office, U. S. N. 30 cents.

NAVIGATION: THEORETICAL AND PRACTICAL—D. Wilson Barker. Illustrated. \$1.50.

PRACTICAL MECHANICS, Applied to the Requirements of the Sailor—Thos. Mackenzie. \$1.50.

TRIGONOMETRY FOR THE YOUNG SAILOR—R. C. Buck. \$1.50.

ELEMENTARY SEAMANSHIP—D. Wilson Barker. \$2.

LATITUDE AND LONGITUDE: How to Find Them—W. J. Millar. \$1.

ILLUSTRATED MARINE ENCYCLOPEDIA—Capt. H. Paasch. \$5.

CONSTRUCTION AND MAINTENANCE OF VESSELS BUILT OF STEEL—Thos. Walton.

OCEAN METEOROLOGY: For Vessels of the Merchant Navy—William Allingham. \$2.

Books on Marine Engineering, On the Operation of Engines and for Beginners in the Engine Room.

ARITHMETIC OF THE STEAM ENGINE—E. S. Gould. \$1.

STEAM BOILERS—Joshua Rose. Practical treatise on construction and examination—Seventy-three engravings. \$2.

AIDS TO ENGINEERS' EXAMINATIONS, with Questions and Answers—N. Hawkins. \$2.

HAWKINS' INDICATOR CATECHISM. \$1.

NEW CATECHISM OF ELECTRICITY—N. Hawkins. \$2.

REED'S ENGINEERS' HAND BOOK—New edition; illustrated by 345 diagrams and 36 large plates. \$5. REED'S GUIDE. \$5.

REED'S KEY to Reed's Hand Book—Contains working of all questions given in examination papers. \$3.

KEY TO ENGINES AND ENGINE RUNNING—Joshua Rose. For use of those desiring to pass examination to take charge of an engine or boiler. \$2.50.

HIGH SPEED STEAM ENGINES—W. Norris and Ben H. Morgan—With 115 Illustrations. \$2.50.

THE SLIDE VALVE, SIMPLY EXPLAINED—W. J. Tennant. \$1.

WATER TUBE BOILERS—Fourth revised and enlarged edition of HOW TO RUN ENGINES AND BOILERS—E. P. Watson. Practical instruction for young engineers and steam users. \$1.

ROPER'S ENGINEER'S HANDY BOOK for Steam Engineers and Electricians. Revised and enlarged. \$3.50.

STEAM AND THE MARINE STEAM ENGINE—Jno. Yeo. \$2.50.

MARINE STEAM ENGINES—Sennett & Oram. \$6.

POCKET BOOK OF MARINE ENGINEERING, RULES AND TABLES—Seaton and Routhwaite. For marine engineers, naval architects, superintendents and others engaged in construction of marine machinery. \$3.

A MANUAL OF MARINE ENGINEERING—A. E. Seaton. Designing, construction and working of marine machinery; standard for reference among marine books. \$6.

PRACTICAL ADVICE FOR MARINE ENGINEERS—C. W. Roberts. 64 illustrations. \$1.

MARINE BOILER MANAGEMENT AND CONSTRUCTION—C. E. Stromeyer. \$5.

BREAKDOWNS AT SEA AND HOW TO REPAIR THEM—A. R. Leask. 252 pages. \$2.

ELEMENTARY LESSONS IN STEAM MACHINERY—Langmaid and Galsford. For students and subordinates in marine engineering. \$2.

USEFUL HINTS TO SEAGOING ENGINEERS—How to avoid and repair breakdowns. \$1.40.

ENGINEER'S MANUAL—By Ainsley. \$5.

MARINE PROPELLERS—By Barnaby. \$4.25.

MODERN MARINE ENGINEERING—By Burgh. \$10.

AMERICAN MARINE ENGINEER—By Edwards. \$2.50.

MODERN AMERICAN MARINE ENGINES—By Edwards. \$5.

CATECHISM OF THE MARINE STEAM ENGINE—Edwards. \$2.

STEAMSHIPS AND THEIR MACHINERY—By Haldane. \$6.

MARINE STEAM ENGINES—Main and Brown. \$5.

PROGRESS OF MARINE ENGINEERING—By Main. \$3.

MARINE ENGINES AND STEAM VESSELS—By Murray. \$1.60.

SCREW PROPULSION—By Taylor. \$3.75.

ELECTRIC LIGHTING FOR MARINE ENGINEERS—S. F. Walker. \$2.

BREAKDOWNS—Thos. Reed. \$1.50.

KEY TO ENGINEERING, WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY and ENGINEER'S EPITOME—Three excellent little books for marine engineers. 50 cents each, or three for \$1.

TEXT BOOK ON MARINE ENGINEERING—Tompkins. \$3.00.

A LIBRARY OF STEAM ENGINEERING—John Fehrenbach, M. E. \$5.

THE NAVAL ENGINEER AND THE COMMAND OF THE SEA—F. G. Burton. \$1.25.

MECHANICS' AND ENGINEERS' POCKET BOOK, including Naval Architecture, Steam and the Steam Engine, Steam Vessels, etc. 64th edition, 1050 pages. Chas. H. Haswell. \$4.

EXAMINATION QUESTIONS AND ANSWERS—Emory Edwards. 900 examination questions and answers for young engineers and firemen who desire to obtain marine licenses. \$1.50.

GAS AND OIL ENGINES—G. Richmond. A practical hand book on the care and management of gas engines, with instructions for running oil engines. \$1.

SLIDE VALVES—C. W. MacCord, Jr. A book for practical men on the principles and methods of design. \$1.50.

A HAND BOOK OF ENGINEERING PRACTICE—Richard A. Smart. \$1.25.

MODERN EXAMINATIONS OF STEAM ENGINEERS—W. H. Wakeman. \$1.50.

THEORETICAL AND PRACTICAL AMMONIA REFRIGERATION—I. I. Redwood. \$1.

MACHINISTS' AND DRAFTMEN'S HAND BOOK—Peder Lobben. A reference book for all interested in mechanical work. \$2.50.

MARINE ENGINEERS—Constantine. Just out. \$2.50.

ENGINES AND ENGINE RUNNING—Joshua Rose. For the use of those who desire to pass an examination to take charge of an engine or boiler; illustrated. \$2.50.

SMALL ENGINES AND BOILERS—Egbert P. Watson. A manual of concise and specific directions for construction of small steam engines and boilers of modern types; illustrated. \$1.25.

DRAWING AND DESIGNING FOR MARINE ENGINEERS—Chas. W. Roberts. \$3.

MARINE ENGINES—R. Murray. \$1.80.

MARINE BOILERS—L. E. Bertin. 250 illustrations, designs and tables. \$7.50.

MARINE BOILERS—Triplex. \$1.

REED'S MARINE BOILERS—H. T. Davis. Second edition, revised and enlarged. \$2.

MARINE ENGINEERS' RECORD BOOK—Bartley C. Bryan. Designed to contain a complete record of all the parts of a set of marine engines, auxiliary engines, pumps, etc. \$2.

MECHANICAL ENGINEERS' POCKET BOOK—Wm. Kent. Reference book of rules, tables, etc. \$5.

RESISTANCE AND PROPULSION OF SHIPS—W. F. Durand, principal of school of marine construction, Cornell University. \$5.

The Marine Review Publishing Co.,

Sent to any address, carriage prepaid, at prices named.

PERRY-PAYNE BUILDING, CLEVELAND.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 418-419 Perry-Payne Bldg., Cleveland. See accompanying Index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Chicago Pneumatic Tool Co. Chicago.
Philadelphia Pneumatic Tool Co. Philadelphia.

ANCHORS.

Baldt Anchor Co. Chester, Pa.
International Anchor Co. Cleveland.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons. Philadelphia.
Magnolia Metal Co. New York.
Phosphor Bronze Smelting Co., Ltd. Philadelphia.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co. Cleveland.
Bloomsburg & Co., H. Newport News, Va.
Buffalo Forge Co. Buffalo.
Detroit Shipbuilding Co. Detroit.
Sturtevant, B. F. Co. Boston.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Crowl, Samuel H. Cleveland.
Gilchrist, Albert J. Cleveland.
Goulder, Holding & Masten. Cleveland.
Hoyt, Dustin & Kelley. Cleveland.
MacDonald, Ray G. Chicago.
Pinney, Orestes C. Cleveland.
Stowe & Graydon. Chicago.
White, Johnson, McCaslin & Cannon. Cleveland.

AXLES, SOLID AND HOLLOW.

Bethlehem Steel Co. So. Bethlehem, Pa.

BABBITT METAL.

Cramp, Wm. & Sons. Philadelphia.
Magnolia Metal Co. New York.
Phosphor Bronze Smelting Co., Ltd. Philadelphia.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co. New York.
Ritchie, E. S. & Sons. Brookline, Mass.

BENDING AND STRAIGHTENING ROLLS.

Cleveland Punch & Shear Works Co. Cleveland.
New Doty Mfg. Co. Janesville, Wis.
Niles Tool Works Co. Hamilton, O.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co. Boston, Mass.
Cleveland Block Co. Cleveland.

BLOWERS.

Buffalo Forge Co. Buffalo.
Sturtevant, B. F. Co. Boston.

BOAT NAILS AND SPIKES.

American Steel & Wire Co. Chicago.

BOAT BUILDERS.

Drein, Thos. & Son. Wilmington, Del.
Electric Boat Co. New York.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. New York.
Kahnweiler's Sons, David. New York.
Lane & DeGroot. Brooklyn.
Willard, Chas. P. & Co. Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co. Providence, R. I.
American Ship Building Co. Cleveland.
Atlantic Works. East Boston, Mass.
Babcock & Wilcox Co. New York.
Bath Iron Works, Ltd. Bath, Me.
Boyer Water Tube Boiler Co. New York.
Chicago Ship Building Co. Chicago.
Cramp, Wm. & Sons. Philadelphia.
Delaunay, Belleville & Co. St. Denis, France.
Detroit Screw Works. Detroit.
Detroit Shipbuilding Co. Detroit.
Farrar & Trefts. Buffalo.
Fletcher, W. & A. Co. Hoboken, N. J.
Fore River Engine Co. Weymouth, Mass.
Gas Engine & Power Co. Morris Heights, N. Y.
Hardy, John B. Tacoma, Wash.
Harlan & Hollingsworth Co. Wilmington, Del.
Hodge, S. F. & Co. Detroit.
Jenks Ship Building Co. Port Huron, Mich.
Kingsford Foundry & Machine Works. Oswego, N. Y.
MacKinnon Mfg. Co. Bay City, Mich.
Maryland Steel Co. Sparrow's Point, Md.
Moran Bros. Co. Seattle, Wash.
Morse Iron Works & Dry Dock Co. Brooklyn.
Neafle & Levy Ship & Engine Building Co. Philadelphia.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis. Elizabeth, N. J.
Pusey & Jones Co. Wilmington, Del.
Risdon Iron Works. San Francisco.
Roberts Safety Water Tube Boiler Co. New York.
Stirling, The Co. Chicago.
Trigg, Wm. R. Co. Richmond, Va.
Union Iron Works. San Francisco.
Willard, Chas. P. & Co. Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works. Chicago.

BOILER TUBES, SEAMLESS, WELDLESS.

Shelby Steel Tube Co. Cleveland.

BOILER FURNACES, FIRE FRONTS, ETC.

Continental Iron Works. New York.

BOILER RIVETS.

Bourne-Fuller Co. Cleveland.
Champion Rivet Co. Cleveland.

BOILER STAYBOLTS, IRON OR STEEL,
HOLLOW OR SOLID.

Falls Hollow Staybolt Co. Cuyahoga Falls, O.

BOLT CUTTERS.

Niles Tool Works Co. Hamilton, O.

BORING AND TURNING MILLS.

Niles Tool Works Co. Hamilton, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons. Philadelphia.
Illinois Smelting & Refining Works. Chicago.
Phosphor Bronze Smelting Co. Philadelphia.

BRIDGES, BUILDERS OF.

American Bridge Co. New York.
Scherzer Rolling Lift Bridge Co. Chicago.

BUCKETS, ORE AND COAL.

Brown Hoisting & Conveying Machine Co. Cleveland.
McMylef Mfg. Co. Cleveland.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co. Cleveland.

CAPSTANS.

American Ship Windlass Co. Providence, R. I.
Hyde Windlass Co. Bath, Me.

CHAINS.

Lebanon Chain Works. Lebanon, Pa.
Monongahela Iron & Steel Co. Pittsburgh.
Newhall Chain Forge & Iron Co. New York.
Standard Chain Co. Pittsburgh.

CHAIN HOISTS.

Boston & Lockport Block Co. Boston, Mass.

CHUCKING MACHINES.

Niles Tool Works Co. Hamilton, O.

CHUCKS FOR LATHES, DRILLS AND
PLANERS.

Skinner Chuck Co. New Britain, Conn.

CIRCULATOR, EQUILIBRIUM,
with Steam Heating Attachment.

Bloomsburg & Co., H. Newport News, Va.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co. Boston.
Bliss, John & Co. New York.
Ritchie, E. S. & Sons. Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt. Philadelphia.
Hanna, M. A. & Co. Cleveland.
Pickards, Mather & Co. Cleveland.
Pittsburg Coal Co. Cleveland.
Rochester & Pittsburgh Coal & Iron Co. Buffalo.

COAL AND ORE HANDLING MACHINERY.

Brown Hoisting & Conveying Machine Co. Cleveland.
Lidgerwood Mfg. Co. New York.
McMyler Mfg. Co. Cleveland.

COMPASSES.

Bliss, John & Co. New York.
Ritchie, E. S. & Sons. Brookline, Mass.

COMPASS ADJUSTER.

Simpson, Geo. A. Sault Ste. Marie, Mich.

CORK JACKETS AND RINGS.

Armstrong Cork Co. Pittsburgh, Pa.
Kahnweiler's Sons, D. New York.
Lane & DeGroot. Brooklyn.

CORRESPONDENCE SCHOOLS—ENGINEERING
AND NAVIGATION.

American School of Correspondence. Boston.
Buffalo Nautical School. Buffalo.
Chicago Nautical School. Chicago.

CRANES, CONVEYORS, HOISTS.

Brown Hoisting & Conveying Machine Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Lidgerwood Mfg. Co. New York.
McMyler Mfg. Co. Cleveland.
Westinghouse Electric & Mfg. Co. Pittsburgh.

CRANK PINS.

Bethlehem Steel Co. South Bethlehem, Pa.
Cleveland City Forge & Iron Co. Cleveland.

DRILL PRESSES—DRILLS OF ALL KINDS.

Cleveland Punch & Shear Works Co. Cleveland.

Niles Tool Works Co. Hamilton, O.

DRYING APPARATUS.

Sturtevant, B. F. Co. Boston.

DRILLS, PNEUMATIC.

Chicago Pneumatic Tool Co. Chicago.
Philadelphia Pneumatic Tool Co. Philadelphia.
Standard Pneumatic Tool Co. Chicago.

DRY DOCKS.

American Ship Building Co. Cleveland.
Bath Iron Works, Ltd. Bath, Me.
Buffalo Dry Dock Co. Buffalo.
Chicago Ship Building Co. Chicago.
Craig Ship Building Co. Toledo, O.
Cramp, Wm. & Sons. Philadelphia.
Detroit Shipbuilding Co. Detroit.
Harlan & Hollingsworth Co. Wilmington, Del.
Maryland Steel Co. Sparrow's Point, Md.
Moran Bros. Co. Seattle, Wash.
Morse Iron Works & Dry Dock Co. Brooklyn.
Newport News Ship Building Co. Elizabeth, N. J.
Nixon, Lewis. Wilmington, Del.
Pusey & Jones Co. New York.
Townsend & Downey Ship Bldg. Co. New York.
Union Dry Dock Co. Buffalo.
Union Iron Works. San Francisco.

ELEVATORS.

Morse, Williams & Co. Philadelphia.

ELECTRIC AUTOMATIC WHISTLE
OPERATORS.

Signal & Control Co. New York.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co. Buffalo.
Electro-Dynamic Co. Philadelphia.
Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Sturtevant, B. F. Co. Boston.
Westinghouse Electric & Mfg. Co. Pittsburgh, Pa.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co. Cleveland.
General Electric Co. Schenectady, N. Y.
Lidgerwood Mfg. Co. New York.
Westinghouse Electric & Mfg. Co. Pittsburgh, Pa.

ELECTRIC STEERING GEAR, SPEED AND
RUDDER INDICATORS, ETC.

Electro-Dynamic Co. Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co. Cleveland.
Atlantic Works. East Boston, Mass.
Bath Iron Works, Ltd. Bath, Me.
Chicago Ship Building Co. Chicago.
Chase Machine Co. Cleveland.
Craig Ship Building Co. Toledo, O.
Cramp, Wm. & Sons. Philadelphia.
Detroit Shipbuilding Co. Detroit.
Farrar & Trefts. Buffalo.
Fletcher, W. & A. Co. Hoboken, N. J.
Fore River Engine Co. Weymouth, Mass.
Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated. New York.
Hardy, John B. Tacoma, Wash.
Harlan & Hollingsworth Co. Wilmington, Del.
Hodge, S. F. & Co. Detroit.
Jenks Ship Building Co. Port Huron, Mich.
MacKinnon Mfg. Co. Bay City, Mich.
Maryland Steel Co. Sparrow's Point, Md.
Moran Bros. Co. Seattle, Wash.
Morse Iron Works & Dry Dock Co. Brooklyn.
Neafle & Levy Ship & Engine Bldg. Co. Philadelphia.
Newport News Ship Building Co. Elizabeth, N. J.
Nixon, Lewis. New York.
Pusey & Jones Co. Wilmington, Del.
Risdon Iron Works. San Francisco.
Roach's Ship Yard. Chester, Pa.
Sheriffs Mfg. Co. Milwaukee.
Trigg, Wm. R. Co. Richmond, Va.
Trout, H. G. Buffalo.
Union Iron Works. San Francisco.
Willard, Chas. P. & Co. Chicago.

ENGINE ROOM TELEGRAPH, CALL BELLS,
ETC.

Cory, Chas. & Son. New York.
Electro-Dynamic Co. Philadelphia.

ENGINEERS, MARINE AND MECHANICAL.

Electro-Dynamic Co. Philadelphia.
Hunt, Robt. W. & Co. Cleveland.
Miller, Walter. Pittsburgh.
Pittsburgh Testing Laboratory, Ltd. Pittsburgh.
Powell, Ambrose V. Chicago.
See, Horace. New York.
Wood, W. J. Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Buffalo Forge Co. Buffalo.
Sturtevant, B. F. Co. Boston.

FEED WATER PURIFIERS AND HEATERS.

Learnmonth, Robert. Buffalo.
Warren Webster & Co. Camden, N. J.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

Page Bros. & Co. Boston.

FORGES.

Buffalo Forge Co. Buffalo.
Sturtevant, B. F. Co. Boston.

FORGINGS, IRON AND STEEL.

Bethlehem Steel Co. South Bethlehem, Pa.
Bourne-Fuller Co. Cleveland.
Cleveland City Forge & Iron Co. Cleveland.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

FLUSHOMETERS.	
Kenney, The Co.....	New York.
FURNACES FOR BOILERS.	
Continental Iron Works.....	New York.
FUELING COMPANIES AND COAL DEALERS.	
Castner, Curran & Bullitt (Pocahontas).....	Philadelphia.
Graham, James & Co.....	Detroit.
Hanna, M. A. & Co.....	Cleveland.
Pickands, Mather & Co.....	Cleveland.
Pittsburg Coal Co.....	Cleveland.
Rochester & Pittsburgh Coal & Iron Co.....	Buffalo.
Smith, Stanley B. & Co.....	Detroit.
Youghiogheny & Lehigh Coal Co.....	Chicago.
GAS BUOYS.	
Safety Car Heating & Lighting Co.....	New York.
GAS AND GASOLINE ENGINES.	
McMyler Mfg. Co.....	Cleveland.
Olds Motor Works.....	Detroit.
GAGES, STEAM AND VACUUM.	
American Steam Gauge Co.....	Boston.
Ashton Valve Co.....	Boston.
Crosby Steam Gage & Valve Co.....	Boston.
GRAPHITE.	
Dixon Crucible Co., Joseph.....	Jersey City, N. J.
HAMMERS, PNEUMATIC.	
Chicago Pneumatic Tool Co.....	Chicago.
Philadelphia Pneumatic Tool Co.....	Philadelphia.
Standard Pneumatic Tool Co.....	Chicago.
HAMMERS, POWER DROP.	
Chase Machine Co.....	Cleveland.
Niles Tool Works Co.....	Hamilton, O.
HAWSERS, WIRE.	
American Steel & Wire Co.....	Chicago.
HEATING APPARATUS.	
Sturtevant, B. F. Co.....	Boston.
HOISTS FOR CARGO, ETC.	
American Ship Building Co.....	Cleveland.
Brown Hoisting & Conveying Machine Co.....	Cleveland.
Chase Machine Co.....	Cleveland.
Elwell-Parker Electric Co.....	Cleveland.
General Electric Co.....	New York.
Hodge, S. F. & Co.....	Detroit.
Hyde Windlass Co.....	Bath, Me.
Lidgerwood Mfg. Co.....	New York.
McMyler Mfg. Co.....	Cleveland.
Marine Iron Co.....	Bay City.
Westinghouse Electric & Mfg. Co.....	Pittsburg.
INDICATORS FOR STEAM ENGINES.	
American Steam Gauge Co.....	Boston.
Ashton Valve Co.....	Boston.
Crosby Steam Gage & Valve Co.....	Boston.
INJECTORS.	
Jenkins Bros.....	New York.
Penberthy Injector Co.....	Detroit.
INSURANCE, MARINE.	
Brown & Co.....	Buffalo.
Drake & Maytham.....	Buffalo.
Elphicke, C. W. & Co.....	Chicago.
Gibbs & Joys.....	Milwaukee.
Hawgood & Moore.....	Cleveland.
Heim, D. T. & Co.....	Duluth, Minn.
Hutchinson & Co.....	Cleveland.
Keith, J. G. & Co.....	Chicago.
La Salle & Co.....	Duluth.
Mitchell & Co.....	Cleveland.
Osborn, F. H. & Co.....	Chicago.
Pauly, H. J.....	Milwaukee.
Parker, A. A. & W. B.....	Detroit.
Peck, Chas. E. & W. F.....	New York and Chicago.
Richardson, W. C.....	Cleveland.
IRON ORE AND PIG IRON.	
Bourne-Fuller Co.....	Cleveland.
Hanna, M. A. & Co.....	Cleveland.
Pickands, Mather & Co.....	Cleveland.
IRON OR STEEL STAYBOLTS, HOLLOW OR SOLID.	
Falls Hollow Staybolt Co.....	Cuyahoga Falls, O.
LATHES OF ALL KINDS.	
Niles Tool Works Co.....	Hamilton, O.
LAUNCHES—NAPHTHA, ELECTRIC.	
Electric Boat Co.....	New York.
Gas Engine & Power Co.....	New York.
LIFE PRESERVERS, LIFE BOATS, BUOYS, RAFTS, ETC.	
Armstrong Cork Co.....	Pittsburg.
Drein, Thos. & Son.....	Wilmington, Del.
Kahnweiler's Sons, D.....	New York.
Lane & DeGroot.....	Brooklyn.
LIGHTS, SIDE AND SIGNAL.	
Page Bros. & Co.....	Boston.
MACHINE TOOLS.	
Niles Tool Works Co.....	Hamilton, O.
MACHINE TOOLS (WOOD WORKING).	
Fay & Egan Co., J. A.....	Cincinnati, O.
Atlantic Works, Inc.....	Philadelphia.
MARINE RAILWAYS, BUILDERS OF	
Crandall & Son, H. I.....	East Boston, Mass.
MATTRESSES, CUSHIONS, BEDDING.	
Fogg, M. W.....	New York.
METALLIC PACKING.	
Katzenstein, L. & Co.....	New York.
U. S. Metallic Packing Co.....	Philadelphia.
METALS FOR BEARINGS.	
Cramp, Wm. & Sons.....	Philadelphia.
Magnolia Metal Co.....	New York.
Phosphor Bronze Smelting Co., Ltd.....	Philadelphia.
METAL POLISH.	
Bertram's Oil Polish Co.....	Boston, Mass.
MILLING MACHINES OF ALL KINDS.	
Niles Tool Works Co.....	Hamilton, O.
NAUTICAL INSTRUMENTS.	
Bliss, John & Co.....	New York.
Ritchie, E. S. & Sons.....	Brookline, Mass.
NAVAL ARCHITECTS.	
Curr, Robert.....	Cleveland.
See, Horace.....	New York.
Wood, W. J.....	Chicago.
NICKEL STEEL FORGINGS.	
Bethlehem Steel Co.....	South Bethlehem, Pa.
OAKUM.	
Stratford Oakum Co., Geo.....	Jersey City, N. J.
OILS AND LUBRICANTS.	
Dixon Crucible Co., Joseph.....	Jersey City, N. J.
Standard Oil Co.....	Cleveland.
PACKING.	
Jenkins Bros.....	New York.
Katzenstein, L. & Co.....	New York.
U. S. Metallic Packing Co.....	Philadelphia.
PAINTS.	
Baker, Howard H. & Co.....	Buffalo.
Smith, Edward & Co.....	New York.
Upson-Walton Co.....	Cleveland.
PAINTING MACHINES, PNEUMATIC.	
Chicago Pneumatic Tool Co.....	Chicago.
PATENT ATTORNEYS.	
Thurston & Bates.....	Cleveland.
PATTERN SHOP MACHINERY.	
Fay & Egan Co., J. A.....	Cincinnati, O.
Atlantic Works, Inc.....	Philadelphia.
PIPE, WROUGHT IRON.	
Bourne-Fuller Co.....	Cleveland.
PLANERS OF ALL KINDS.	
Niles Tool Works Co.....	Hamilton, O.
PLANING MILL MACHINERY.	
Fay & Egan Co., J. A.....	Cincinnati, O.
Atlantic Works, Inc.....	Philadelphia.
PLUMBING, MARINE.	
Ellis Marine Plumbing Co.....	New York.
Mott Iron Works, J. L.....	New York.
Sands, Alfred B. & Son.....	New York.
Kenney, The Co.....	New York.
PNEUMATIC TOOLS.	
Chicago Pneumatic Tool Co.....	Chicago.
Philadelphia Pneumatic Tool Co.....	Philadelphia.
Standard Pneumatic Tool Co.....	Chicago.
POLISH FOR METALS.	
Bertram's Oil Polish Co.....	Boston.
PROPELLER WHEELS.	
American Ship Building Co.....	Cleveland.
Atlantic Works.....	East Boston, Mass.
Bath Iron Works, Ltd.....	Bath, Me.
Cramp, Wm. & Sons.....	Philadelphia.
Detroit Shipbuilding Co.....	Detroit.
Farrar & Trefts.....	Buffalo.
Fore River Engine Co.....	Weymouth, Mass.
Hardy, John B.....	Tacoma, Wash.
Hyde Windlass Co.....	Bath, Me.
Harian & Hollingsworth Co.....	Wilmington, Del.
Hodge, S. F. & Co.....	Detroit.
Jenks Ship Building Co.....	Port Huron, Mich.
MacKinnon Mfg. Co.....	Bay City, Mich.
Maryland Steel Co.....	Sparrow's Point, Md.
Moran Bros. Co.....	Seattle, Wash.
Morse Iron Works & Dry Dock Co.....	Brooklyn.
Neafie & Levy Ship & Engine Bldg. Co.....	Philadelphia.
Newport News Ship Building Co.....	Newport News, Va.
Nixon, Lewis.....	Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd.....	Philadelphia.
Pusey & Jones Co.....	Wilmington, Del.
Risdon Iron Works.....	San Francisco.
Roach's Ship Yard.....	Chester, Pa.
Townsend & Downey Ship Bldg. Co.....	New York.
Trigg, Wm. R. Co.....	Richmond, Va.
Union Dry Dock Co.....	Buffalo.
Union Iron Works.....	San Francisco.
Willard, Chas. P. & Co.....	Chicago.
SHIP CHANDLERS.	
Baker, Howard H. & Co.....	Buffalo.
Marine Supply Co.....	Fairport Harbor, O.
Moran Bros. Co.....	Seattle, Wash.
Upson-Walton Co.....	Cleveland.
SPARS—LARGE SIZES.	
Moran Bros. Co.....	Seattle, Wash.
STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.	
Falls Hollow Staybolt Co.....	Cuyahoga Falls, O.
STEAM VESSEL FOR SALE.	
Holmes, Samuel.....	New York.
STEEL OR IRON STAYBOLTS, HOLLOW OR SOLID.	
Falls Hollow Staybolt Co.....	Cuyahoga Falls, O.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line..... New York.
 Erie & Western Trans. Co..... Buffalo.
 International Nav. Co..... Philadelphia.
 Red Star Line..... New York.

STEEL SHAFTS, SOLID OR HOLLOW.

Bethlehem Steel Co..... South Bethlehem, Pa.

STEERING APPARATUS.

American Ship Building Co..... Cleveland.
 Chase Machine Co..... Cleveland.
 Detroit Shipbuilding Co..... Detroit.
 Electro-Dynamic Co..... Philadelphia.
 Hyde Windlass Co..... Bath, Me.
 Jenks Ship Building Co..... Port Huron, Mich.
 Queen City Engineering Co..... Buffalo.
 Sheriffs Mfg. Co..... Milwaukee.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co..... Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co..... Chester, Pa.
 International Anchor Co..... Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.

American Bridge Co..... New York.

SURVEYORS, MARINE.

Curr, Robert..... Cleveland.
 Gibbs & Joys..... Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son..... New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co..... Chicago.
 Pittsburgh Testing Laboratory, Ltd..... Pittsburgh.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co..... Peabody, Mass.

TIMBER—LARGE PIECES.

Moran Bros. Co..... Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Chicago Pneumatic Tool Co..... Chicago.
 Cleveland Punch & Shear Works Co..... Cleveland.
 New Doty Mfg. Co..... Janesville, Wis.

Niles Tool Works Co..... Hamilton, O.
 Philadelphia Pneumatic Tool Co..... Philadelphia.
 Standard Pneumatic Tool Co..... Chicago.
 Wood, R. D. & Co..... Philadelphia.

TOOLS, WOOD WORKING.

Fay & Egan Co., J. A..... Cincinnati, O.
 Atlantic Works, Inc..... Philadelphia.

TRUCKS.

Boston & Lockport Block Co..... Boston.

TOWING MACHINES.

American Ship Windlass Co..... Providence, R. I.
 Chase Machine Co..... Cleveland.
 Playfair's Barge & Tug Line..... Midland, Ont.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co..... Kingston, Ont.
 Swain Wrecking Co..... Detroit.

TUBING FOR BOILERS.

Shelby Steel Tube Co..... Cleveland.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co..... Boston.
 Ashton Valve Co..... Boston.
 Crosby Steam Gage & Valve Co..... Boston.
 Jenkins Bros..... New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.

Smith, Edward & Co..... New York.

VARNISH PAINT.

Mair, John & Son..... Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J..... Buffalo.
 Brown & Co..... Buffalo.
 Drake & Maytham..... Buffalo.
 Elphicke, C. W. & Co..... Chicago.
 Gibbs & Joys..... Milwaukee.
 Hall & Root..... Buffalo.
 Hawgood & Moore..... Cleveland.
 Helm, D. T. & Co..... Duluth, Minn.
 Holmes, Samuel..... New York.
 Hutchinson & Co..... Cleveland.
 Keith, J. G. & Co..... Chicago.
 Mitchell & Co..... Cleveland.
 Moffat & O'Brien..... San Francisco.

Pauly, H. J..... Milwaukee.
 Richardson, W. C..... Cleveland.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co..... Buffalo.
 Sturtevant, B. F. Co..... Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co..... Chicago.
 Baker, H. H. & Co..... Buffalo.
 Roebling's Sons, John A..... New York and Cleveland.
 Upson-Walton Co..... Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co..... Boston.
 Ashton Valve Co..... Boston.
 Crosby Steam Gage & Valve Co..... Boston.
 Signal & Control Co..... New York.

WINDLASSES.

American Ship Windlass Co..... Providence, R. I.
 American Ship Building Co..... Cleveland.
 Hyde Windlass Co..... Bath, Me.
 Jenks Ship Building Co..... Port Huron, Mich.

WINCHES.

American Ship Windlass Co..... Providence, R. I.
 Hyde Windlass Co..... Bath, Me.

WOOD WORKING MACHINERY.

Fay & Egan Co., J. A..... Cincinnati, O.
 Atlantic Works, Inc..... Philadelphia.

WORM GEARING.

Morse, Williams & Co..... Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co..... Kingston, Ont.
 Playfair's Barge & Tug Line..... Midland, Ont.
 Swain Wrecking Co..... Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Sillsby..... Boston.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son..... Wilmington, Del.
 Electric Boat Co..... New York.
 Gas Engine & Power Co..... New York.
 Lane & DeGroot..... Brooklyn.
 Willard, Chas. P. & Co..... Chicago.

YAWLS.

Drein, Thos. & Son..... Wilmington, Del.
 Lane & DeGroot..... Brooklyn.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

Almy Water Tube Boiler Co..... 11	Donnelly Salvage & Wrecking Co..... 32	*Kenney Co., The..... 27	Queen City Engineering Co..... 10
*American Bridge Co..... 25	Drake & Maytham..... 31	Keith, J. G. & Co..... 34	Red Star Line..... 7
American Line..... 7	Drein, Thos. & Son..... 4	Kingsford Foundry & Machine Works..... 30	Richardson, W. C..... 34
American School of Correspondence.... 6	Duluth, South Shore & Atlantic Ry.... 39	Lane & DeGroot..... 4	Risdon Iron Works..... 5
American Ship Building Co..... 1	Egan Co., The..... 7	*Learmonth, Robert..... 30	*Ritchie & Sons, E. S..... 30
American Ship Windlass Co..... 2	Electric Boat Co..... 8	Lebanon Chain Works..... 5	Roach's Ship Yard..... 5
American Steam Gauge Co..... 1	Electro-Dynamic Co..... 1	Lidgerwood Mfg. Co..... 10	Roberts Water Tube Boiler Co..... 11
American Steel & Wire Co..... 1	Elliphicke, C. W. & Co..... 34	L. S. & M. S. Ry..... 39	Rochester & Pittsburgh Coal & Iron Co..... 33
Armstrong Cork Co..... 40	Ellis Marine Plumbing Co..... 7	McMyler Mfg. Co..... 4	*Roebling's, John A. Sons Co..... 40
Ashton Valve Co..... 12	Elphicke, C. W. & Co..... 34	MacDonald, Ray G..... 34	Rushmore Dynamo Works..... 3
Atlantic Works..... 5	Elwell-Parker Electric Co..... 2	*Magnolia Metal Co..... 1	Safety Car Heating & Lighting Co..... 31
Atlantic Works, Inc..... 3	Erie & Western Trans. Co..... 32	MacKinnon Mfg. Co..... 8	Sands, Alfred B. & Son..... 10
Babcock & Wilcox Co..... 11	Falls Hollow Staybolt Co..... 4	Mair, John & Son..... 6	Scherzer Rolling Lift Bridge Co..... 6
Baldt Anchor Co..... 9	Farrar & Trefts..... 5	Marine Iron Co..... 4	See, Horace..... 34
Baker, Howard H. & Co..... 9	Fay & Egan Co., J. A..... 7	Marine Supply Co..... 31	Shelby Steel Tube Co..... 29
Bath Iron Works, Ltd..... 1	Fore River Engine Co..... 5	Martin-Barriss Co..... 9	Sheriffs Mfg. Co..... 10
Bertram's Oil Polish Co..... 1	Fogg, M. W..... 31	Maryland Steel Co..... 5	*Signal & Control Co..... 7
Bessemer Steamship Co..... 32	Gas Engine & Power Co. and Chas. L. Seabury & Co., Consolidated..... 31	Miller, Walter..... 9	Simpson, Geo. A..... 28
Bethlehem Steel Co..... 6	General Electric Co..... 12	Mitchell & Co..... 34	Skinner Chuck Co..... 3
Big Four Railway..... 39	Gibbs & Joys..... 34	Moffat & O'Brien..... 34	Smith, Edward & Co..... 1
Blake, Geo. F., Mfg. Co..... 9	Gilchrist, Albert J..... 34	Monongahela Iron & Steel Co..... 3	Smith, Stanley B. & Co..... 33
*Bliss, John & Co..... 30	Goulder, Holding & Masten..... 34	*Moran Bros. Co..... 39	Stratford Oakum Co., Geo..... 32
*Bloomsburg & Co., H..... 31	Graham, James & Co..... 33	Morse Iron Works & Dry Dock Co..... 4	Standard Chain Co..... 10
Boland, J. J..... 24	Great Lakes Register..... 7	Morse, Williams & Co..... 9	Standard Oil Co..... 31
*Boston & Lockport Block Co..... 40	Hall & Root..... 34	Mott Iron Works, J. L..... 10	Standard Releasing Hook Co..... 4
*Boyer Water Tube Boiler Co..... 31	Hardy, John B..... 4	Nearne & Levy Co..... 5	*Standard Pneumatic Tool Co..... 25
Bourne-Fuller Co..... 12	Harlan & Hollingsworth Co., The..... 5	Newhall Chain Forge & Iron Co..... 30	Stirling Co..... 11
Brown & Co..... 34	Hawgood & Moore..... 34	Newport News Ship Building & Dry Dock Co..... 5	Stowe & Graydon..... 34
Brown Hoisting & Conveying Mach. Co. 2	Helm, D. T. & Co..... 34	Niles Tool Works Co..... 3	Sturtevant, B. F. Co..... 40
Buffalo Dry Dock Co..... 11	Herriman, F. D..... 7	Nixon, Lewis..... 5	Swain Wrecking Co..... 32
Buffalo Forge Co..... 12	Hodge, S. F. & Co..... 8	North River Iron Works..... 5	Thurston & Bates..... 34
Buffalo Nautical School..... 6	Holmes, Samuel..... 34	Olds Motor Works..... 8	Townsend & Downey Ship Bldg. Co..... 4
Castner, Curran & Bullitt..... 33	Hoyt, Dustin & Kelley..... 34	Osborne & Co., F. H..... 34	Trigg Co., Wm. R..... 4
Champion Rivet Co..... 8	Hutchinson & Co..... 34	Page Bros. & Co..... 3	Trout, H. G..... 9
Chase Machine Co..... 6	Hyde Windlass Co..... 40	Parker, A. A. & B. W..... 32	Warren Webster & Co..... 10
Chicago Nautical School..... 6	Jenkins Brothers..... 10-12	Pauly, H. J..... 34	Westinghouse Electric & Mfg. Co..... 6
Chicago Pneumatic Tool Co..... 26	Jenks Ship Building Co..... 39	Peck, Chas. E. & W. F..... 34	White, Johnson, McCaslin & Cannon..... 34
Chicago Ship Building Co..... 2	International Anchor Co..... 9	*Penberthy Injector Co..... 7	Willard, Chas. P. & Co..... 8
Cleveland & Buffalo Transit Co..... 39	International Navigation Co..... 7	Philadelphia Pneumatic Tool Co..... 10	Wilson, Thomas..... 34
Cleveland City Forge & Iron Co..... 6	Jenkins, Brothers..... 10-12	Phosphor Bronze Smelting Co., Ltd..... 9	Wilson & Silsby..... 6
*Cleveland Punch & Shear Works Co. 30	Jenks Ship Building Co..... 39	Pickands, Mather & Co..... 32	Wood, W. J..... 34
C. C. C. & St. L. R. R. 39	Junks Ship Building Co..... 39	Pinney, Orestes C..... 34	*Wood & Co., R. D..... 30
Continental Iron Works..... 2	Kahnweiler's Sons, David..... 4	Pittsburg Coal Co..... 33	Worthington, Henry R..... 9
Cory, Chas. & Son..... 10	Katzenstein, L. & Co..... 4	Pittsburgh Testing Laboratory, Ltd..... 34	Wright, Herbert & Co..... 34
*Craig Ship Building Co..... 30	Kensington Brothers..... 10-12	Playfair's Barge & Tug Line..... 40	Youghiogheny & Lehigh Coal Co..... 33
Cramp, Wm., & Sons, S. & E. B. Co. 1	Junks Ship Building Co..... 39	Powell, Ambrose V..... 34	
Crandall & Son, H. I..... 7	Kahnweiler's Sons, David..... 4	Pusey & Jones Co..... 5	
Crosby Steam Gage & Valve Co..... 12	Katzenstein, L. & Co..... 4		
Crowl, Samuel H..... 34			
Curr, Robert..... 34			
Davidson, M. T..... 9			
Dearborn Drug & Chemical Works..... 30			
DeLauney, Belleville & Co..... 27			
Delaware River Iron S. B. & E. Works 5			
Detroit Shipbuilding Co..... 1			
Detroit Screw Works..... 11			
Dixon Crucible Co., Joseph..... 9			



OIL OR GREASE?

Whichever you use, you will obtain the best results if you feed it to the bearings from a

TRADE
PENBERTHY
MARK.

OILER OR GREASE CUP.

We have them for all purposes and of all styles and sizes. Send for Circulars.

AND DO NOT FORGET WE MANUFACTURE AND GUARANTEE THE
ERWIN STEAM RAM

MOST ECONOMICAL WATER ELEVATING DEVICE
AND THE WORLD RENOWNED

PENBERTHY AUTOMATIC INJECTOR.

OVER 200,000 IN USE

PENBERTHY INJECTOR CO.

WINDSOR, CANADA

DETROIT, MICHIGAN

C&B
LINE

**CLEVELAND
TO
BUFFALO**

"While you Sleep"

UNPARALLELED NIGHT SERVICE.
NEW STEAMERS

"CITY OF BUFFALO"
AND
"CITY OF ERIE"

both together being without doubt, in all respects, the finest and fastest that are run in the interest of the traveling public in the United States.

TIME CARD.
DAILY INCLUDING SUNDAY

Leave Cleveland 8 P. M. Arrive Buffalo 6 A. M.
" Buffalo 8 " " Cleveland 6 "

CENTRAL STANDARD TIME.

Connections made at Buffalo with trains for all Eastern and Canadian points. Ask ticket agent for tickets via C. & B. Line. Send four cents for illustrated pamphlet. **SPECIAL LOW RATES TO BUFFALO AND NIAGARA FALLS EVERY SATURDAY NIGHT.**

W. F. HERMAN, GENERAL PASSENGER AGENT, CLEVELAND, O.

WANTED FOR SALE, FOR CHARTER Etc.

Space under this heading 25 cents a line, each insertion, for three insertions or less. Special rates for periods of more than three insertions.

—FOR SALE—Marine fire-box boiler, 10 ft. long, 7 ft. 11 in. in height, 7 ft. 10 in. width. Two furnaces of 20 sq. ft. grate surface each. Good as new. Will pass government inspection at 100 lbs. working pressure. Price, \$1,600. Johnson Iron Works, Ltd., P. O. Box 241, New Orleans, La. Dec. 6

—FOR SALE OR EXCHANGE—Forty acres No. 1 fruit land overlooking Kalamazoo river, Michigan, for fish tug or machinery suitable for 50 ft. hull. Geo. Wolf, 232 Hamilton street, Cleveland, O. Nov. 22

—WANTED—Steam vessel of about 50 ft. length, 5 ft. draught and 25 H.P. Address Eric, care the Marine Review Pub. Co., Perry-Payne Bldg., Cleveland.

—FOR SALE—A new \$1,200 gasoline launch for \$700; guaranteed at every point. Address C. N. Tallman, care Post Standard, Syracuse, N. Y.

—WANTED—Loan of \$1,000 on steamboat property. Will give good security. Address box 10 the Marine Review Pub. Co., Cleveland, O. Nov. 8

—FOR SALE—Passenger steamer 177 ft. over all. In good condition. Carries 500 tons freight. Allowed 500 passengers; will sleep 120 and can be made to sleep 200. Steeple compound engines, double fire-box boiler. Speed, 11½ miles. Reason for selling is that vessel is not speedy enough for present service. Address Passenger steamer, The Marine Review Pub. Co., Cleveland. tf

—FOR SALE—Two tugs, one of 65 ft. keel with engines 20x22 and the other of 61 ft. keel with engines 20x20. Ranney Bros., 34 River st., Cleveland. Nov. 15

—FOR SALE—Good tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. Dec. 27

LAKE SHORE & MICHIGAN SOUTHERN RAILWAY.

CLEVELAND CITY TICKET OFFICE,
237 SUPERIOR STREET.

	Ar. fr. West.	Dep. East.
No. 18, Southwestern Limited.....	*1 55 am	*2 20 am
No. 22, Lake Shore Limited.....	*2 15 am	*3 00 am
No. 28, New York & Boston Express.....	*7 40 am	*11 30 am
No. 32, Fast Mail.....	*11 25 am	...
No. 44, Accommodation, via Sandusky.....	*1 25 pm	...
No. 46, Southwestern Express.....	...	*3 00 pm
No. 6, Limited Fast Mail.....	*5 40 pm	*5 45 pm
No. 10, Chicago, New York & Boston Special.....	*7 35 pm	*7 40 pm
No. 16, New England Express.....	*10 30 pm	*10 35 pm
No. 2, Day Express.....	*19 05 pm	*19 20 pm
No. 126, Norwalk Accommodation.....	*7 55 am	...
No. 40, Toledo & Buffalo Accom., via Norwalk.....	*10 00 am	*10 30 am
No. 126, Norwalk Accommodation.....	*7 55 am	...
No. 116, Conneaut Accommodation.....	...	*4 30 pm

Eastward:— Ar. fr. East. Dep. West.

No. 11, Southwestern Limited.....	*3 25 am	*3 10 am
No. 15, New York, Boston & Chicago Special.....	*3 05 am	*5 20 am
No. 21, New York & Chicago Express.....	*5 10 am	*6 30 am
No. 7, Day Express.....	...	*7 40 am
No. 19, The Lake Shore Limited.....	*7 35 am	*11 15 am
No. 23, Western Express.....	*11 10 am	...
No. 33, Southwestern Express.....	*12 25 pm	...
No. 133, Cleveland & Detroit Express.....	...	*12 30 pm
No. 47, Accommodation.....	...	*13 00 pm
No. 141, Sandusky Accommodation.....	...	*13 10 pm
No. 127, Norwalk Accommodation.....	...	*5 10 pm
No. 37, Pacific Express.....	*6 35 pm	*7 00 pm
No. 3, Fast Mail Limited.....	*10 50 pm	*10 55 pm

Westward:— Ar. fr. East. Dep. West.

*Daily. [†]Daily except Sunday. Trains Nos. 28 and 37 run via Erie station.

Winter Tourist Rates to CUBA, FLORIDA,

Gulf Coast Points and all Inland Southern Winter Resorts,

ALSO TEXAS, MEXICO AND CALIFORNIA.

VIA "BIG FOUR ROUTE."

Take advantage of the Low Rates and Long Return Limit.

For full information and particulars as to rates, tickets, limits, etc., call on Agents "Big Four Route," or address the undersigned.

WARREN J. LYNCH, W. P. DEPPE, D. JAY COLVER, C. P. & T. A.
Genl. Pass. & Tkt. Agt. A. G. P. & T. A. 116 Euclid Ave.
CINCINNATI, O. CINCINNATI, O. CLEVELAND.

DULUTH, SOUTH SHORE AND ATLANTIC RAILWAY.

THE MARQUETTE ROUTE

MARQUETTE, MICH.

"The Queen of Northern Summer Resorts."

Hotel Accommodations thoroughly first-class, headed by the Hotel Superior, the finest Hostelry on the Great Lakes.

GEO. B. ROSS, Lessor, HOTEL SUPERIOR, MARQUETTE, MICH.; Proprietor LEXINGTON HOTEL, CHICAGO, ILL.; formerly Manager CHICAGO BEACH HOTEL.

—WRITE THE UNDERSIGNED FOR ILLUSTRATED PUBLICATIONS.—

E. C. OVIATT, G. A. CLIFFORD, A. E. EDMONDS,
Trav. Pass. Agent, Trav. Pass. Agent, City Pass. Agent,
75 Ottawa St., GRAND RAPIDS, MICH. CINCINNATI, OHIO. DETROIT, MICH.
F. W. SALSBURY, J. F. LEE, GEO. W. HIBBARD,
Commercial Agent, Gen'l Agt. Pass. Dept., Gen'l Pass. Agent,
PITTSBURG, PA. 228 So. Clark St., CHICAGO, ILL. MARQUETTE, MICH.

W. S. JENKS,
President.

O. L. JENKS,
Vice-Pres. and Treas.

A. M. CARPENTER,
Sec. and Gen'l Mgr.

The Jenks Ship Building Co.

Office and Machine Shops at Fourth St.

Yards: Foot of Lincoln Ave.

PORT HURON, MICH.

Steel and Wood Ship Builders.

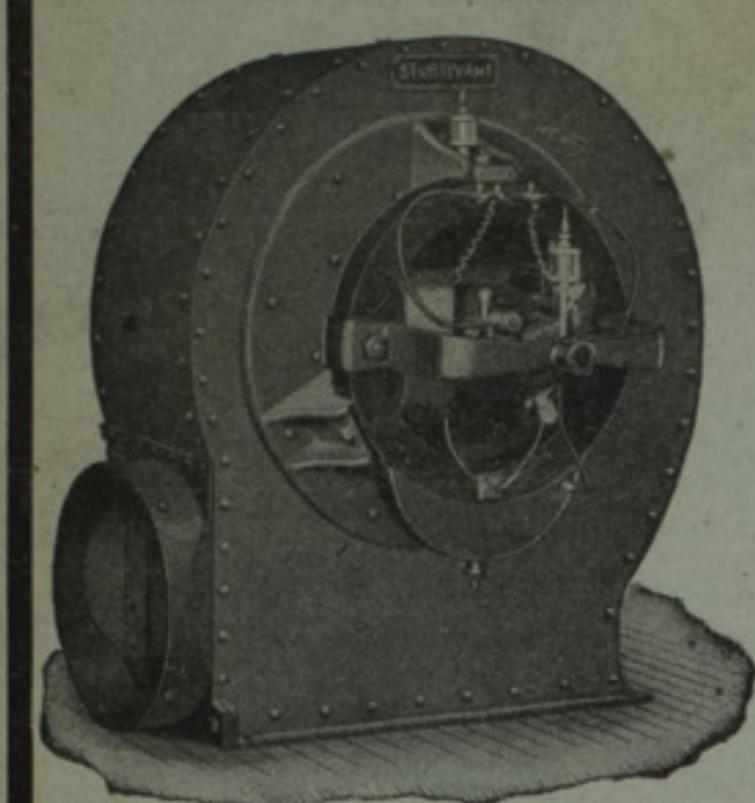
Marine Engines and Boilers.

STEAM WINDLASSES,

CAPSTANS AND

STEERING APPARATUS.

PROMPT ATTENTION GIVEN TO REPAIRS OF ALL KINDS
ON SHIPS, ENGINES AND BOILERS.



Electric
Fans

FOR SHIP VENTILATION

Send for Bulletin H.

B. F. STURTEVANT
COMPANY,
BOSTON, MASS.

NEW YORK. CHICAGO.
PHILADELPHIA. LONDON.

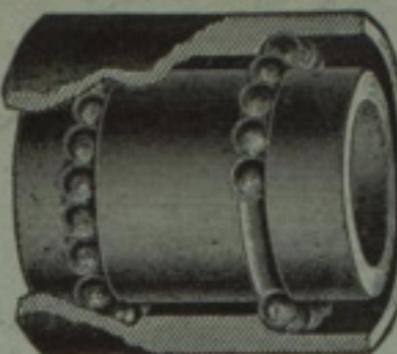
(9)

The Upson-Walton Co.,

155-161 RIVER STREET, CLEVELAND, OHIO,

SELL THE

Cleveland Block



SLEEVE SHOWING CONSTRUCTION.
BALL BEARING SHEAVES,
THE LATEST IMPROVEMENT

TO BE FOUND ON
NEARLY ALL THE MODERN
LAKE VESSELS.

PHOTOGRAPHS OF SHIPS.

We make a Specialty of them.
Will secure such as are not in stock.

THE MARINE REVIEW PUB. CO., 418-19 PERRY-PAYNE BLDG., CLEVELAND.

U. S. METALLIC PACKING CO.

429 N. 13th St. PHILADELPHIA PA.

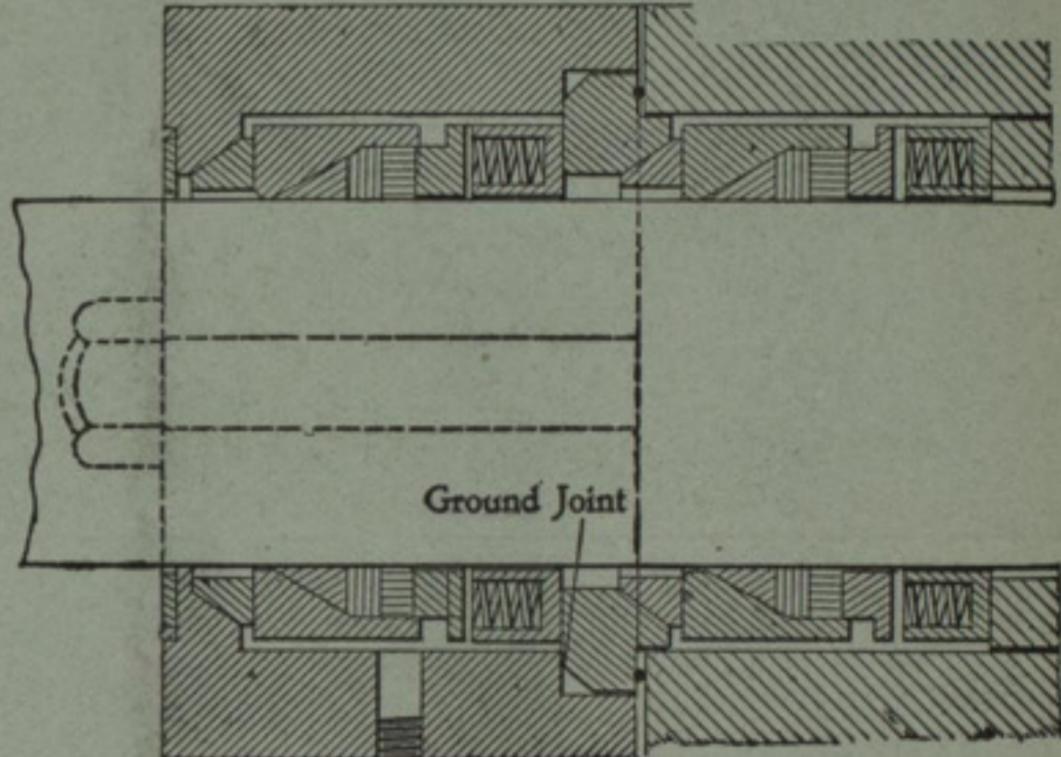
120,000 PACKINGS IN USE.

12,000 APPLIED IN 1899.

Extensively Used on Ocean, Lake, and Stationary Engines.

Cheap, Durable and Small Cost for Repairs.

SEND FOR CATALOGUE.



Send for Table of Contents.

1900 EDITION

Blue Book of American Shipping.

STANDARD MARINE DIRECTORY OF THE UNITED STATES.

SHIPS.

SHIP OWNERS.

SHIP MASTERS.

SHIP BUILDERS.

NAVAL ARCHITECTS.

MARINE ENGINEERS.

Lists of the above and many other interests connected with Shipping. Statistics of American Water Commerce.

Price \$5.

THE MARINE REVIEW PUB. CO., 418-19 Perry-Payne Building, CLEVELAND, O.

RUBBER COVERED WIRES AND CABLES

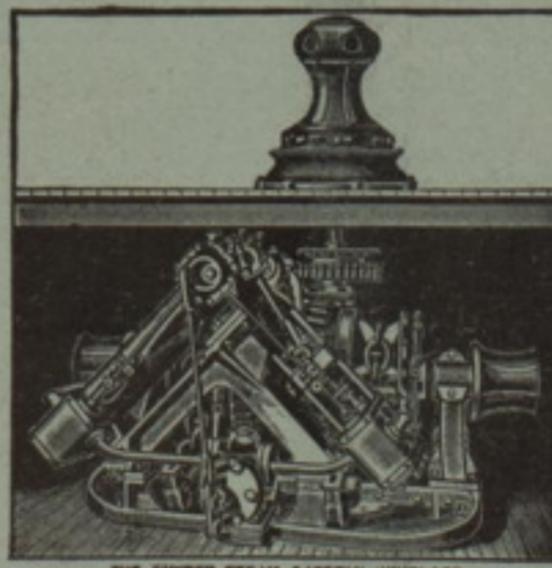
W
I
R
E



R
O
P
E

CLEVELAND STORE, 88 Superior Street.

WINDLASSES AND CAPSTANS



The Hyde Steam and Power Windlasses and Capstans are the best in the market.

They have been selected for most of the vessels now building for the Navy Department, Revenue Marine, Light-house Board and United States Coast Survey.

They are being furnished for the majority of the highest class Steam Ships, Merchant Vessels and Yachts now building.

HYDE WINDLASS CO., Bath, Me.

LIFE PRESERVERS—BUOYS.

Acme, Solid Cork. Granulated Cork.

EACH PRESERVER stamped by United States Inspector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY,
BOSTON, NEW YORK, PHILADELPHIA, PITTSBURG, CHICAGO, ST. LOUIS.

PLAYFAIR'S BARGE & TUG LINE
MIDLAND, ONT., CAN.

FIRST-CLASS TUGS FOR WRECKING, RAFT-TOWING, ETC.

STEAM PUMPS, DIVERS, JACKS, HAWSERS, LIGHTERS.

MARINE REVIEW

AMERICAN STEEL METAL OIL POLISH CO., Boston, Mass.

VOL. XXII.

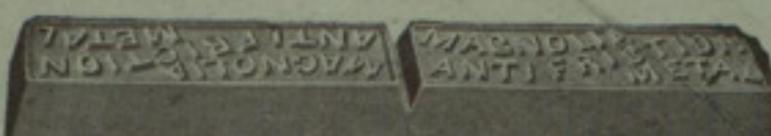
CLEVELAND, O., NOVEMBER 15, 1900.

No. 20.



MAGNOLIA METAL.

USED BY ALL THE LEADING GOVERNMENTS.
BEST ANTI-FRICTION METAL FOR ALL MACHINERY BEARINGS.



Beware of Imitations.
For Sale by all Dealers.

If local dealers have not Magnolia Metal in stock, telegraph us at our expense
Fisher Bldg., 281 Dearborn St., Chicago. **MAGNOLIA METAL CO.**
Also London--Montreal--Pittsburg--Boston.
San Francisco--Philadelphia.

266-267 West Street, New York,
OWNERS AND SOLE MANUFACTURERS.

W. L. BROWN, President.
R. L. IRELAND, Vice-president.
R. C. WETMORE, Sec'y and Treas.
JAS. C. WALLACE, Gen'l Manager.

DRY DOCKS IN CLEVELAND:
No. 1, foot Weddell St., 440 ft. x 50 ft. x 16 ft.
No. 2, foot Weddell St., 300 ft. x 55 ft. x 13 ft.
No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain: 560 ft. x 60 ft. x 17 ft.

**The Wm. Cramp & Sons
Ship and Engine Building Co.
PHILADELPHIA.**
SOLE MANUFACTURERS IN AMERICA OF
**Parsons Manganese Bronze
AND Parsons White Brass.**

EDWARD W. HYDE, President. H. H. McCARTY, Treasurer.
JOHN S. HYDE, Vice-Pres. and Gen'l Supt.

**BATH IRON WORKS, Ltd.
Ship Builders and Engineers,
BATH, MAINE.**

The American Ship Building Co.

OFFICE, 120 VIADUCT, CLEVELAND, O.

STEEL SHIPS

MARINE AND STATIONARY ENGINES.
BOILERS AND AUXILIARY MACHINERY.

PROMPT ATTENTION GIVEN TO SHIP
REPAIRS OF ALL KINDS.

WORKS AT
CLEVELAND AND LORAIN.

**THE ELECTRO-DYNAMIC COMPANY,
DESIGNERS AND
MANUFACTURERS OF Electrical Machinery**

STEERING GEARS, TELEGRAPHS,
WATERTIGHT FITTINGS, YACHT PLANTS,
HELM ANGLE INDICATORS,
REVOLUTION AND DIRECTION INDICATORS.

PHILADELPHIA, PA., U. S. A.

224 Ionic Street.

CABLE ADDRESS EDCO.

A B C CODE 4TH EDITION.

**WIRES HAWSERS
RIGGING** GALVANIZED.
STRONGEST.
MOST SATISFACTORY.
AMERICAN STEEL & WIRE COMPANY, - THE ROOKERY, - CHICAGO, ILL.

ALEXANDER McVITTIE, President and Manager.
WILLIAM C. McMILLAN, Vice-President.

CHARLES B. CALDER, General Superintendent.

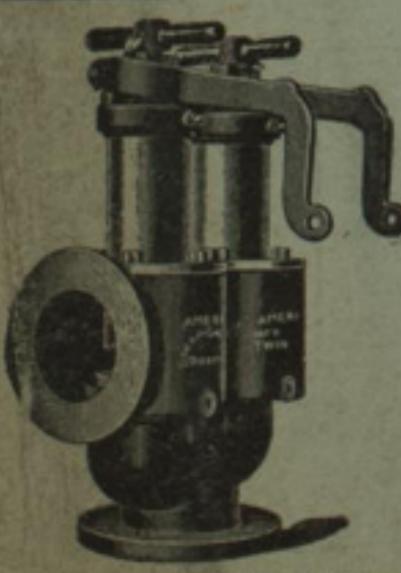
M. E. FARR, Secretary and Treasurer.
FRANK E. KIRBY, Consulting Engineer.

**DETROIT SHIPBUILDING COMPANY,
SHIP AND ENGINE BUILDERS,**

DETROIT, MICH.

Sole Owners for the Lakes and Atlantic Coast of the **HOWDEN HOT DRAFT SYSTEM**,
as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Mich.
Wooden Ship Yards and Dry Docks, Foot of Orleans
Street, and Foot of Clark Ave., DETROIT, MI.



**AMERICAN STEAM GAUGE COMPANY,
(Original Steam Gauge Company.)**

NEW YORK. BOSTON. CHICAGO.

MANUFACTURERS OF

Gauges that Gauge,
Indicators that Indicate,
Pops that Pop.

American Patent Twin Marine
Pop Valve.
Government Pattern.

Original and only Genuine Thompson Indicator.
Clocks, Revolution Counters, Whistles, and all kinds of
Steamship Instruments.



SPAR COATING.

A perfect finish for all wood work, spars
and iron work exposed to excessive
changes in weather and temperature.

EDWARD SMITH & CO.,

Varnish Makers and Color Grinders.

45 BROADWAY,

NEW YORK.

COAL AND ORE HANDLING MACHINERY.

CRANES OF ALL TYPES—Electric, Steam and Hand Power.

MACHINERY FOR HANDLING STRUCTURAL WORK, MARINE PLATES, ETC., IN SHIP-BUILDING YARDS.

THE BROWN HOISTING AND CONVEYING MACHINE CO.

New York Office, Havemeyer Building.
Pittsburg Office, Carnegie Building.

CLEVELAND. OHIO U. S. A.

London: 39 Victoria Street,
Westminster, S. W.

ELWELL-PARKER MARINE GENERATING SETS.

Now recognized as the Standard on the Great Lakes.

GENERATORS AND MOTORS, ANY SIZE, FOR SHIP YARDS, DOCKS, WHARVES, &C.

COMPLETE LIGHTING AND POWER PLANTS Manufactured and Installed.

ELWELL-PARKER ELECTRIC CO. OF AMERICA, CLEVELAND, O.

AMERICAN SHIP WINDLASS CO.

P. O. BOX 53, PROVIDENCE, R. I.

—BUILDERS OF THE—

“PROVIDENCE” WINDLASSES AND CAPSTANS.

350 STYLES AND SIZES.
OVER 5,000 IN USE.

SEND FOR CATALOGUE.

FRANK S. MANTON, Agent.

WILLIAM L. BROWN,
President.

B. W. WELLS,
Vice-President.

O. R. SINCLAIR,
Sec'y and Treas.

JOHN A. UBSDELL, JR.,
Genl. Mngr.

CHICAGO SHIP BUILDING COMPANY,

Long Distance Telephones.

Ship Yard and Dry Dock Office,
“South Chicago 40.”

Chicago Office, 1125 Rookery,
“Harrison” 1207.

STEEL SHIP BUILDERS AND
DRY DOCK PROPRIETORS.

Dry Dock and Yards: 101st St. and Calumet River, CHICAGO, ILL.

MORISON SUSPENSION BOILER FURNACES

FOR
LAND and MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.

Also Fox Corrugated Furnaces.

Manufactured by

THE CONTINENTAL IRON WORKS,

West and Calyer Sts. NEW YORK,

Near 10th and 23d Sts. Ferries.

Borough of Brooklyn

A COMPLETE SET OF CHARTS OF THE GREAT LAKES TEN IN ALL.

LAKE SUPERIOR.
LAKE MICHIGAN.
LAKE HURON.
LAKE ERIE.

ST. MARY'S RIVER IN TWO PARTS.

DETROIT RIVER.
ST. CLAIR RIVER.
LAKE ST. CLAIR.
STRAITS OF MACKINAC.

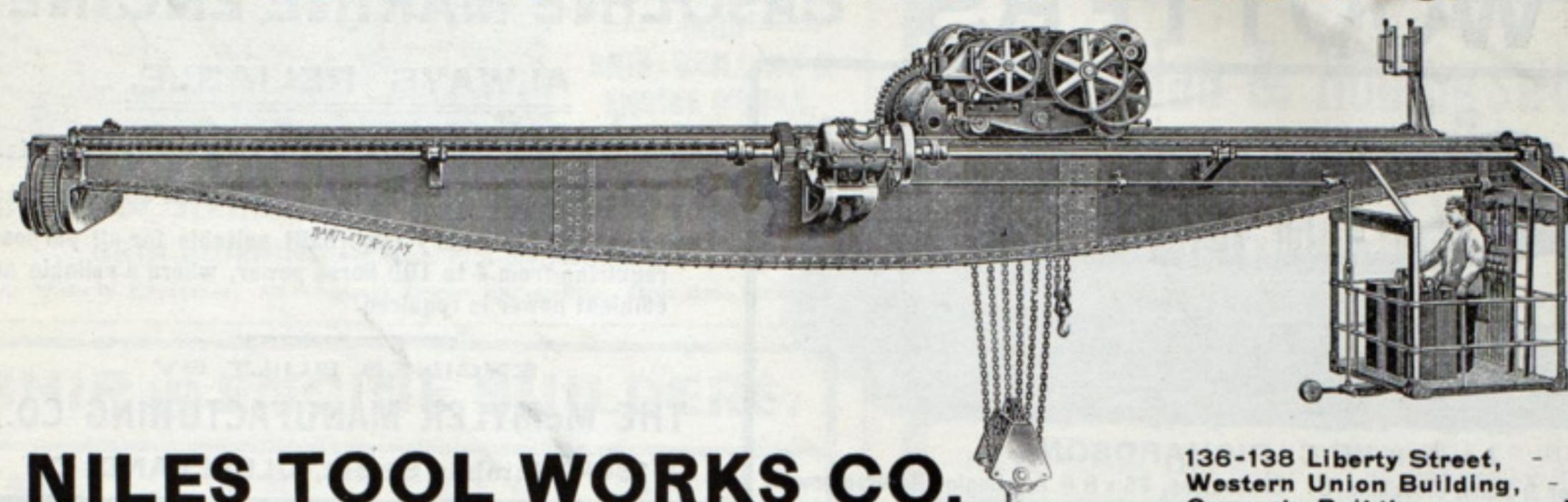
Sent to any address, carriage prepaid for \$4.95.

THE MARINE REVIEW PUB. CO.,

418-19 Perry-Payne Building, CLEVELAND, O.

REASONABLE DELIVERIES

NILES ELECTRIC TRAVELING CRANES.



BUILT ON LATEST AND MOST IMPROVED DESIGNS. — APPLY TO

NILES TOOL WORKS CO.

136-138 Liberty Street, — NEW YORK.
Western Union Building, — CHICAGO.
Carnegie Building, — PITTSBURG.
23-25 Victoria St., — LONDON, ENG.

ESTABLISHED 1869.

ATLANTIC WORKS, Incorporated,
Successors to Berry & Orton Company.

2223-25-27 & 29 Arch St., PHILADELPHIA, PA., U.S.A.

MANUFACTURERS OF

MACHINERY FOR WORKING WOOD FOR USE IN SHIP YARDS,
CAR SHOPS, RAILROAD SHOPS.

ADJUSTABLE BEVEL BAND SAW.

Will bevel both ways to 45 degrees.
Power movement to change angles.
Power feed in three directions.

SEND FOR CATALOGUE.

Hollow Chisel Mortisers.

INCORPORATED 1896.

ESTIMATES FURNISHED.

Car Sill Dressers.

Monongahela Iron and Steel Co.
MANUFACTURERS OF

CHARCOAL BAR IRON **CARTER BRANDS** ALL SIZES.

CHARCOAL IRON CHAINS

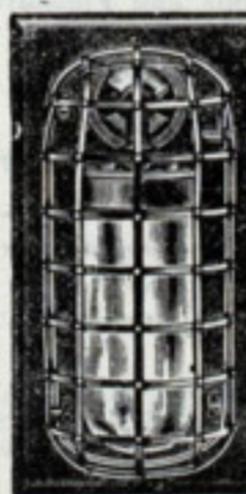
United States Government Specifications Guaranteed.

PITTSBURGH, PA.

Ship Lamps
OIL AND ELECTRIC FIXTURES
FOR
Steamships, Yachts, &c.
GREAT VARIETY OF DESIGNS.
Prices and Cuts on Application.

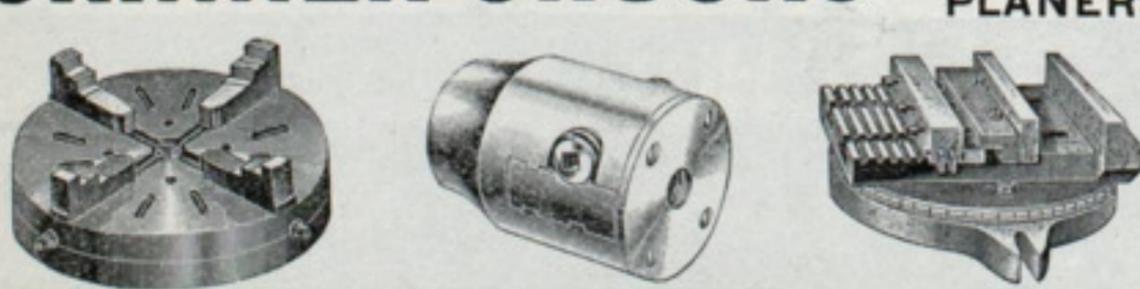
PAGE BROS. & CO.

347 to 357 Cambridge St. Boston, Mass.




SKINNER CHUCKS

For LATHES, DRILLS and PLANERS



A finely illustrated Catalogue, 6 x 9, sent to interested parties.

THE SKINNER CHUCK CO., 340 CHURCH STREET, NEW BRITAIN, CONN.

SEARCH LIGHTS

RUSHMORE PROJECTORS are in almost exclusive use in all classes of service, and are specified for finest Steamers and Yachts.

RUSHMORE DYNAMO WORKS, TELEPHONE 559. JERSEY CITY.

Reed's Engineers' Hand Book.
Reed's Guide to Examinations.
Key to Reed's Engineers' Hand Book.
MARINE REVIEW PUB. CO., Cleveland, O.

PICTURES OF LAKE SHIPS

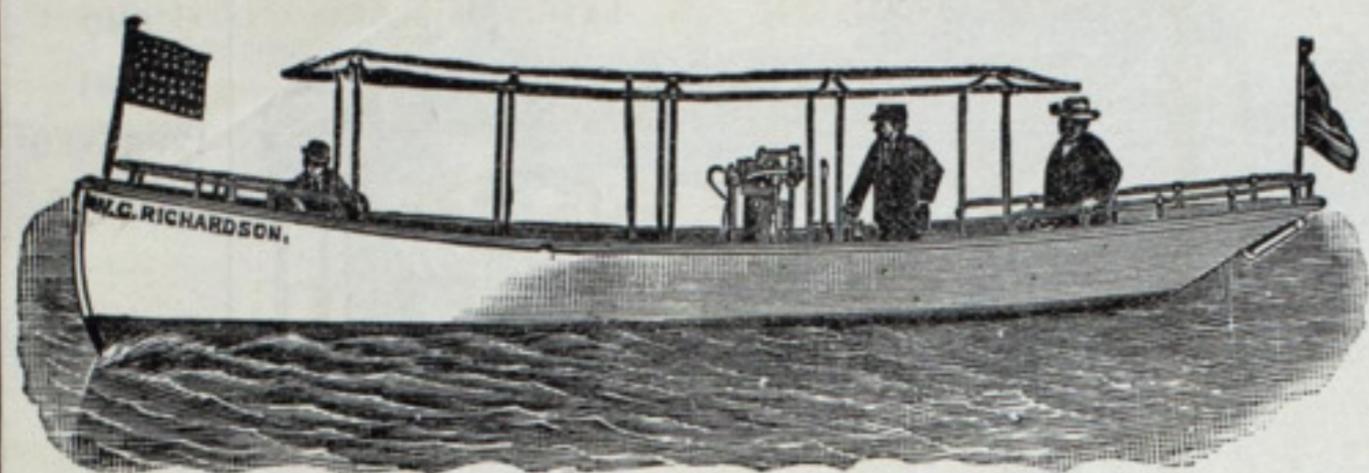
They may be had from the Marine Review, Cleveland.

A PHOTOGRAPHER, SENT TO THE ST. CLAIR RIVER, SECURED SOME FINE PHOTOS, 11 X 14 IN SIZE.

List furnished on application.

THE "WOOTTERS" GASOLINE MARINE ENGINES

ALWAYS RELIABLE.



Launch W. C. RICHARDSON.

Built for Hausheer & Sons, Cleveland, O. Dimensions, 35 x 8 O.A. Engine 8 horse power.

Especially adapted for Launches, Fish Tugs and Ferry Boats.

Catalogue, Prices and Particulars furnished on application.

Engines of the Stationary Type built suitable for all purposes requiring from 4 to 100 horse power, where a reliable and efficient power is required.

ENGINES BUILT BY

THE McMYLER MANUFACTURING CO.,

180 Columbus Street, CLEVELAND, O.

NEVERSINK CORK JACKET AND LIFE BELT.—

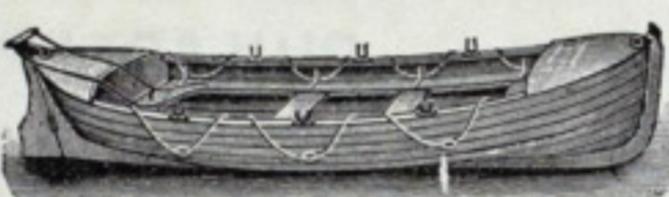
Warranted 24 pounds. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST, CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.

Metallic and Wooden Life Boats.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact Life Raft known.

DAVID KAHNWEILER'S SONS
437 Pearl Street, NEW YORK CITY.

Send for Illustrated Catalogue.

THOS. DREIN & SON



TATNALL AND RAILROAD STS.
WILMINGTON, DEL.

Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats.

Life Preservers.
Outfit for Lake Steamers a Specialty.



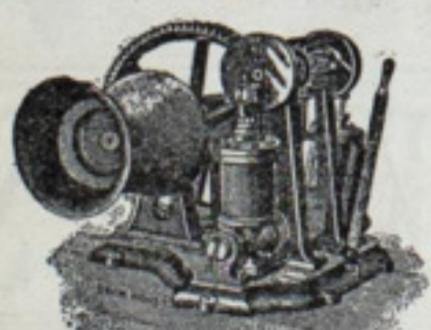
Telephone Call 340-B, Greenpoint.

LANE & DeGROOT, METALLIC LIFE BOATS,

(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, Etc., approved by the U. S. Supervising Inspectors. Also Wood Boats of Every Description. Repairing of every kind promptly attended to.

70 and 72 Kent St., BROOKLYN, NEW YORK.



Hoisting Engines.

We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a hoist for marine work, dock work, mining, or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co. BAY CITY, MICH.

Standard Automatic Releasing Device.

THE FALLS ARE SO ROVE THAT BOTH ENDS OF THE BOAT DETACH, IRRESPECTIVE OF WHICH END STRIKES THE WATER FIRST.

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.

Standard Automatic Releasing Hook Co.,

NEW CHEESEBROUGH BUILDING,

17 State Street, New York, N. Y.



WM. R. TRIGG COMPANY, SHIP BUILDERS, RICHMOND, VA. Government Contractors,

Building United States Torpedo Boats

SHUBRICK, STOCKTON and THORNTON,
and Torpedo Boat Destroyers DALE and DECATUR.

SHIPBUILDING IN ALL ITS BRANCHES.

W. & A. FLETCHER CO. NORTH RIVER IRON WORKS.

Marine Engines, Boilers, Etc.

Hudson, 12th and 14th Streets, Hoboken, N. J.

Take Ferry from foot of West 14th Street, N. Y.

ESTABLISHED 1884.

INCORPORATED 1894.

Morse Iron Works and Dry Dock Co.

ENGINEERS, MACHINISTS
AND BOILER MAKERS.

Excellent Facilities for DOCKING and REPAIRING VESSELS.
CABLE ADDRESS: PYROSISON, N. Y.

Foot 26th and 27th St., BROOKLYN, N. Y.

THE TOWNSEND AND DOWNEY SHIPBUILDING AND REPAIR CO.,

ENGINEERS AND OUTFITTERS, DRY DOCKING AND REPAIRING.
BUILDERS OF STEEL AND WOODEN VESSELS OF ALL TYPES.
CAPACITY NO. 1 DRY DOCK, 4,000 TONS.

Ship Yard and Works, Shooter's Island, Borough of Richmond, New York City.

New York Offices, 22 and 23 D. Produce Exchange.

Cable Address: "TEANDE," N. Y. TELEPHONE CALLS: N. Y. Office, 500 Broad.
Yard and Works, 97 West Brighton.

JOHN B. HARDY, BUILDER OF STEAM VESSELS

EITHER STEEL OR WOOD.

All kinds of Marine Engines and Machinery. Finest Equipped Shop on Puget Sound. Marine Shears of 125 tons capacity. First-class rail facilities.

TACOMA, WASHINGTON.

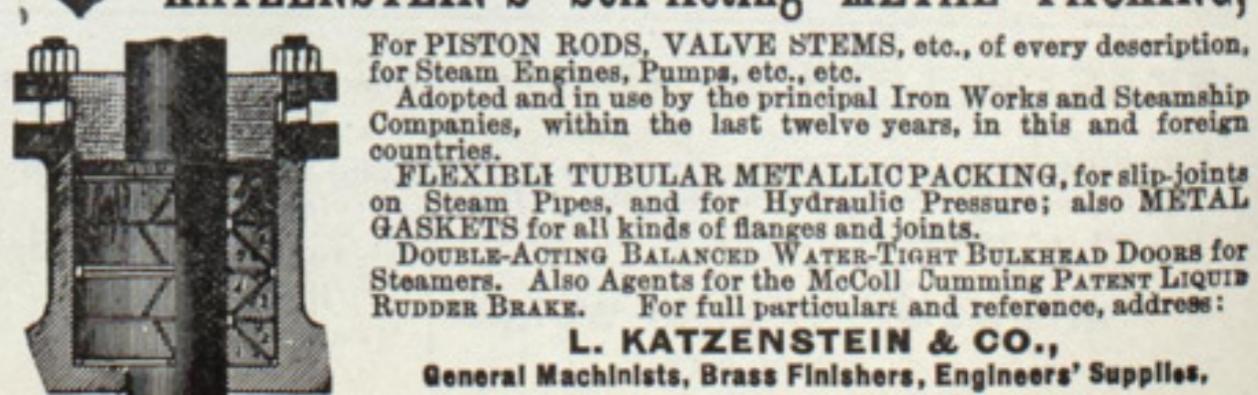
FALLS HOLLOW STAYBOLTS.

ANY SIZE, OUTSIDE OR INSIDE DIAMETER.
AVERAGE LENGTH OF HOLLOW BARS
SIX TO EIGHT FT.

BOTH HOLLOW AND SOLID, MADE OF
THE BEST QUALITY OF CHARCOAL IRON OR STEEL. CUYAHOGA FALLS O. U. S. A.

Guaranteed to pass U. S. Government or Railway Companies Specifications.

KATZENSTEIN'S Self-Acting METAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

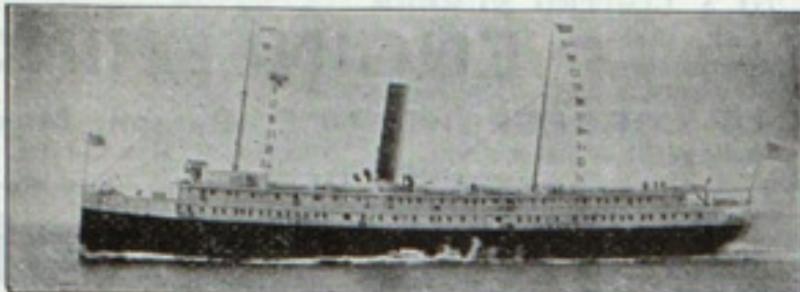
Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

ROACH'S SHIP YARD.



DELAWARE RIVER
IRON
SHIP-BUILDING &
ENGINE WORKS,
CHESTER PA.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

New York Office, Morgan Iron Works, Foot East Ninth St

SHIP AND ENGINE BUILDERS.

Newport News Shipbuilding and Dry Dock Company.

Equipped with a Simpson's Basin Dry Dock capable of docking a vessel 600 feet long drawing 25 feet of water, at any stage of the tide. Repairs made promptly and at reasonable rates.

For estimates and further particulars, address

C. B. ORCUTT, President,
No. 1 BROADWAY, NEW YORK.

WORKS AT NEWPORT NEWS, VA.
(ON HAMPTON ROADS.)

MARYLAND STEEL CO., Marine Department. Ship Builders & Engineers

SPARROW'S POINT, MD.

Baltimore Telephone No. 11. A. G. WILSON, Manager.

Long Distance Telephone Service Between New York, Philadelphia, Boston and Sparrow's Point Offices.

New York Office: 71 Broadway. Boston Office: 70 Kilby Street. Philadelphia Office: 312-319 Girard Building.

The Pusey & Jones Company,

WILMINGTON, DELAWARE.

Builders of IRON AND STEEL STEAMERS, STEAM YACHTS, TOW BOATS, MARINE ENGINES, BOILERS, TANKS, AND OF HEAVY MACHINERY GENERALLY.

ALSO COPPERSMITH WORK.

SPECIAL FACILITIES for REPAIRS to both WOODEN and METAL BOATS. MARINE RAILWAY. NO WHARFAGE CHARGED.

Risdon Iron Works, IRON AND STEEL SHIP BUILDERS, SAN FRANCISCO.

Ship's Cables
Dredge Chains
Steam Shovel Chains
Crane Chains
Block Chains

LEBANON CHAIN WORKS,
LEBANON, PA.
MANUFACTURERS OF
HAND-MADE AND
MACHINE-MADE CHAINS
OF ALL GRADES.
WE MANUFACTURE OUR OWN IRON.
All our Chains are tested. High Grade Chains a Specialty

WORKS AND
MAIN OFFICE, WILMINGTON, DEL.

The Harlan & Hollingsworth Co.

SHIP BUILDERS,
DRY DOCKING, REPAIRING
AND OUTFITTING.

(3-4 CENTURY EXPERIENCE.)

NEW YORK OFFICE, { EXCHANGE COURT BUILDING,
52 BROADWAY, ROOM 702.

UNION IRON WORKS SHIP BUILDERS, SAN FRANCISCO.

MATHIAS SEDDINGER, President.
SOMMERS N. SMITH, Vice-Pres't and Gen'l Mgr.

ESTABLISHED 1838.

THE NEAFIE & LEVY SHIP & ENGINE BUILDING COMPANY, PENN WORKS.

IRON AND STEEL SHIP AND MARINE ENGINE BUILDERS.

SOLE MAKERS OF THE WELL KNOWN

PHILADELPHIA PROPELLER WHEEL.

Beach and Palmer Streets, PHILADELPHIA, PA., U. S. A.

The Atlantic Works,

STEAMSHIPS,
BUILDERS OF STEAM YACHTS,
TOW BOATS, ETC.

EAST BOSTON, MASS.

Marine Engines, Boilers and Tanks,
Heavy Machinery and Plate Iron Work.

LEWIS NIXON, SHIP BUILDER

Office and Works, ELIZABETH, N. J.

Builder of Stern-wheel, Paddle and Screw Steamers; also Torpedo
Boats and Barges of all kinds in Steel.

A Specialty made of South American and Alaskan River Boats.

FORE RIVER ENGINE CO., ENGINEERS AND SHIPBUILDERS.

WEYMOUTH, MASS., U. S. A. (Suburb of Boston.)

FAST STEAM YACHTS. MERCHANT VESSELS. MARINE ENGINES. WATER-TUBE BOILERS.

U. S. Torpedo-Boat Destroyers Lawrence and Macdonough now under construction.

FARRAR & TREFTS,

Propeller, Yacht and Tug Wheels.

Marine and Stationary Engines & Boilers.

Repairing Promptly Attended to.

Drilling Boilers and Engines a Specialty.

64 to 66 Perry Street,

BUFFALO, N. Y.

The splendid physical qualities that have put
Fluid-Compressed Open Hearth Steel,
 Hydraulically Forged and Annealed,

in the front rank of materials used for deep-sea shafts should appeal with peculiar force to the owner of the river steamer. A broken shaft presents a sorry spectacle, and tells of false economy where prudence would not have spared a few dollars on first cost.

SEND TO OUR NEAREST OFFICE FOR PAMPHLET.

BETHLEHEM STEEL COMPANY,
 SOUTH BETHLEHEM, PA.

BRANCH OFFICES:

100 Broadway, New York.
 421 Chestnut Street, Philadelphia.
 1433 Marquette Building, Chicago.
 312 Perry-Payne Bldg., Cleveland.
 Fremont and Howard Sts., San Francisco.

930 N. Main Street, St. Louis.
 340-342 Main Street, Cincinnati.
 430 Endicott Building, St. Paul.
 726 Gravier Street, New Orleans.
 4 Bank Block, Denver.

WILSON & SILSBY, Rowe's Wharf,
BOSTON, MASS.
 PARTICULAR ATTENTION GIVEN TO
SAILS FOR RAGING YACHTS. ALSO THE
OUTFITS OF LARGE STEAM YACHTS.

We furnished the Sails for
DEFENDER,
COLONIA,
JUBILEE,
NAVAHOE.

THE CHASE MACHINE COMPANY,
 Engineers and Machinists,
 MANUFACTURERS, UNDER THE CHASE PATENTS OF
 FOG WHISTLE MACHINES, HOISTING ENGINES,
 STEERING ENGINES, AUTOMATIC TOWING ENGINES,
 POWER AND DROP HAMMERS, AND OTHER MACHINERY
 ENGINEERS' SUPPLIES, AND GENERAL JOB WORK.
 TELEPHONE MAIN 994. 111 Elm Street CLEVELAND, OHIO.

EARN MORE MONEY
BY HOME STUDY
FREE SCHOLARSHIPS
 TO A LIMITED NUMBER
IN Electrical, Mechanical, Marine,
 Stationary or Locomotive
 (Including Mechanical Drawing.)
AMERICAN SCHOOL OF CORRESPONDENCE, BOSTON, MASS.
 (Chartered by the Commonwealth of Massachusetts.) MENTION MARINE REVIEW.

Chicago Nautical School,
 MASONIC TEMPLE, CHICAGO.

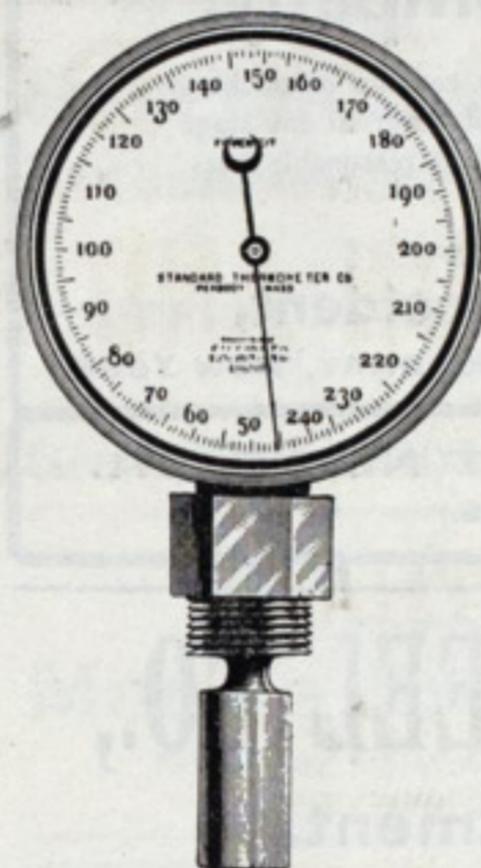
W. J. WILSON, Principal. (Late Lieutenant, U. S. N.)
 A full and complete course of instruction in Lake and Ocean navigation. Also special branches taught those desiring to qualify themselves for better positions in the Marine Service. Students taught by correspondence. Students may begin at any time.

Buffalo Nautical School,

J. C. P. deKRAFFT, Nautical Expert, Principal.

A full course in Lake and Ocean Navigation taught in person. Classes open at close of navigation on the Great Lakes. Pupils may commence at any time. Candidates prepared for examination for raise in papers. Compass adjusting taught, when desired. Write for particulars, prices, etc.

PRUDENTIAL BUILDING, BUFFALO, N. Y.



Helios-Upton Comp'y,
 PEABODY, MASS.

Hot Water Thermometers
 and Thermometers for
 Mechanical Purposes.

Used by U. S. Navy in all New Ships.

Eighty of them furnished
 the Japanese Cruisers
 "Kasagi" and "Chitose."

SEND FOR BULLETIN No. 40 A.

Charts of the Atlantic Coast.

A full equipment of Charts for vessels going from the lakes to salt water may be had from the Marine Review Pub. Co., Perry-Payne Building, Cleveland.

Charts of the St. Lawrence River.

Charts of the Gulf of St. Lawrence.

Charts of Nova Scotia Coast.

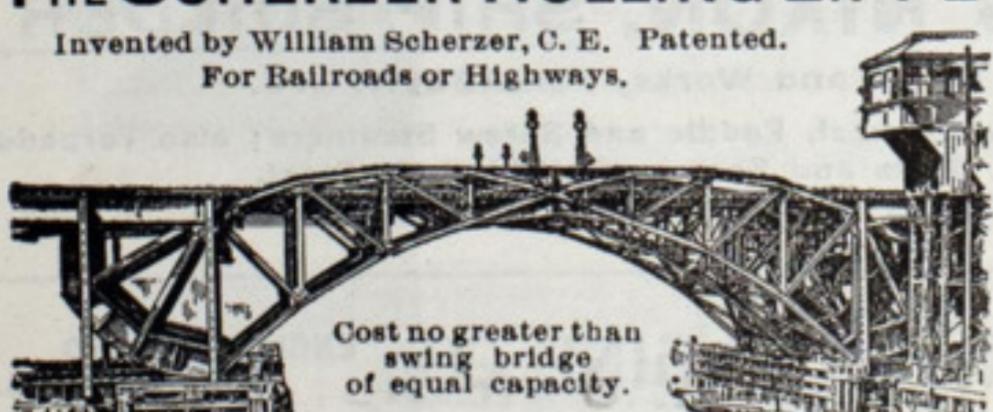
Charts of the U. S. Coast on the Atlantic.

Westinghouse
 Electrical Apparatus

Electric & Manufacturing Co.
 PITTSBURG, PA.
 All principal Cities in U. S. and Canada.

THE SCHERZER ROLLING LIFT BRIDGES

Invented by William Scherzer, C. E. Patented.
 For Railroads or Highways.



Opened
 or
 Closed
 in
 Twenty
 Seconds.

Vessel owners should urge the adoption of these bridges. The 8-track Scherzer Bridge over the Chicago Drainage Canal is the largest movable bridge in the world. A number in successful operation, and several in process of construction.

SCHERZER ROLLING LIFT BRIDGE CO.,
 1616 Monadnock Block, Chicago, Ill.

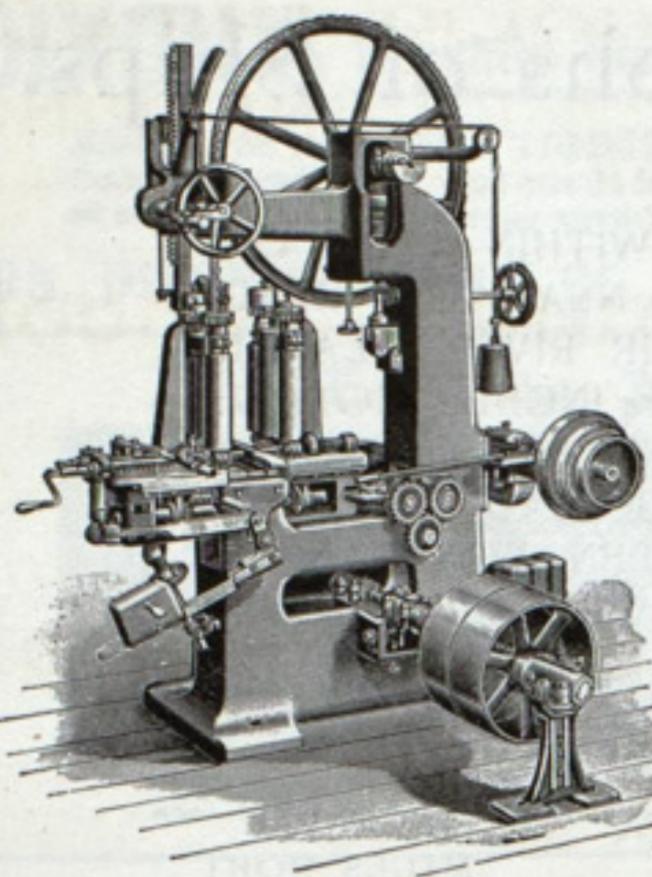
TRY IT ON YOUR BOAT.

A genuine Varnish Paint without gum. Where applied the surface becomes coated as with glass, resisting the influence of weather and of water (salt or fresh) and keeping its gloss for years.

JOHN MAIR & SON. 136 S. Delaware Ave., PHILADELPHIA, PA.



IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT
 COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.



No. 11 BAND RE-SAW.

AN ENTIRELY NEW MACHINE.

AHEAD OF ALL OTHERS.

THE BEST RE-SAW OF MEDIUM CAPACITY YET CONCEIVED. THE HEAVY UPRIGHT COLUMN REDUCES THE TENDENCY TO VIBRATE, ALLOWING IT TO BE RUN ABOUT TWICE THE SPEED OF OTHER STYLES OF RE-SAWS. THE TENSION IS THE MOST SENSITIVE AND RELIABLE EVER INVENTED, AND MAINTAINS A PERFECT AND UNIFORM STRAIN UPON THE BLADE AT ALL TIMES AND UNDER ALL CONDITIONS. THREE SPEEDS OF FEED.

PRICES AND FULL PARTICULARS ON APPLICATION.

J. A. FAY & EGAN CO.

325-345 W. Front St.,

CINCINNATI, O.

UNION DRY DOCK COMPANY,

Buffalo Creek and Ganson St., BUFFALO, N. Y.

BUFFALO,
WILKES-BARRE,

BUILDERS OF

IRON AND STEEL STEAMSHIPS.

STARUCCA,
CODORUS.

Best Place in Buffalo for Prompt and Economical Repairs. Two Dry Docks and Most Modern Machinery Electrically Driven.

ELECTRIC LIGHTING PLANT SO THAT WORK MAY BE CARRIED ON BY NIGHT AS WELL AS BY DAY.

ARE YOU AWARE THAT Crandall's Modern Marine Railways

are the most ideal form of dry dock for working on a ship's bottom?

SAFE. RAPID. COMPLETELY EQUIPPED.

H. I. CRANDALL & SON,
Engineers and Builders,

100 Border Street, EAST BOSTON, MASS.

AMERICAN LINE NEW YORK
SOUTHAMPTON
LONDON

CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Wednesday at 10 A. M.

Steamers: ST LOUIS, ST PAUL, NEW YORK, PARIS.

Special Express Train from Southampton to London in one hour and forty minutes.
Close connection at SOUTHAMPTON for Havre and Paris by
special fast twin-screw Channel Steamers.

RED STAR LINE NEW YORK
ANTWERP
.... PARIS

Sailing Every Wednesday at 12 Noon.

Steamers: Kensington, Southwark, Friesland, Westernland, Noordland

One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE, GERMANY,
THE RHINE, SWITZERLAND and ITALY.

Send for
"Facts for Travelers." **International Navigation Company**
Empire Building, 73 Broadway, New York.

305-307 Walnut St., Philadelphia.
Fiske Building, 89 State Street, Boston.
1306 F St., N.W., Washington, D. C.
30 Montgomery St., San Francisco.

143 LaSalle St., Chicago.
Third and Pine Streets, St. Louis.
10-12-14 Washington Ave., S., Minneapolis.

PIERS: 14 & 15 NORTH RIVER, FOOT OF FULTON ST., NEW YORK.

ELLIS MARINE PLUMBING CO.

(INCORPORATED.)

YACHT AND MARINE PLUMBERS.

Manufacturers of and agents for Modern Plumbing, Fixtures, Drainage Tanks, Ejectors, etc.

Inventors of the

ELLIS SYSTEM.

Positively the most sanitary and modern Plumbing ever installed on board vessel. No pumps are required at any of the fixtures above or below the water line. WRITE FOR PARTICULARS.

ESTIMATES FURNISHED.

32 BROADWAY, NEW YORK

ELECTRIC AUTOMATIC WHISTLE OPERATOR

will operate whistle from any distance with ease and certainty.

WHISTLE BLAST RECORDERS will prove invaluable in cases of collision or grounding through crowding or other causes. STEAM SHIP WHISTLES in all sizes to operate with steam or air. It will pay you to investigate our novel improvements. Catalogues mailed to captains, owners or engineers, upon application.

THE SIGNAL & CONTROL CO., 24-27 WEST STREET,
NEW YORK, U. S. A.

Chas. E. & W. F. Peck,

58 William St., NEW YORK CITY.

Royal Insurance Building, CHICAGO, ILL.

C. T. BOWRING & CO.,

5 and 6 Billiter Avenue, E. C., LONDON, ENG.

INSURANCE

BROWN & CO., . . . 202 Main Street, Buffalo, N. Y.
A. A. & B. W. PARKER, 15 Atwater St., W., Detroit, Mich.
J. G. KEITH & CO., 138 Rialto Building, Chicago, Ill.
LA SALLE & CO., Board of Trade Bldg., Duluth, Minn.

Are prepared to make rates on all classes of Marine Insurance on the Great Lakes, both CARGOES and HULLS.

GREAT LAKES REGISTER

INCORPORATED
COMBINED AND ISSUED IN CONNECTION WITH THE

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

GREAT LAKES REGISTER DESIRES TO ANNOUNCE THAT ITS RATINGS GO BEFORE THE LEADING UNDERWRITERS OF AMERICA ENGLAND AND FRANCE.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES.

F. D. HERRIMAN, SURVEYOR GENERAL,
320-322 PERRY-PAYNE BUILDING, CLEVELAND 0

THE CHAMPION RIVET CO.

Government Work a Specialty.



Finish: Unexcelled. Quality: Highest Standard.

CLEVELAND, O., U.S.A.

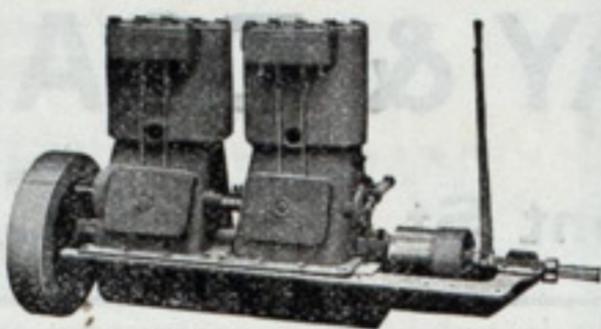
VICTOR BOILER AND STRUCTURAL RIVETS.

MARINE Gasoline Engines.

4 TO 30 H.P.
Exhaust under Water.

COMPACT AND RELIABLE.
Starts Easily, Runs Smoothly and Noiselessly.
SEND FOR CATALOGUE.

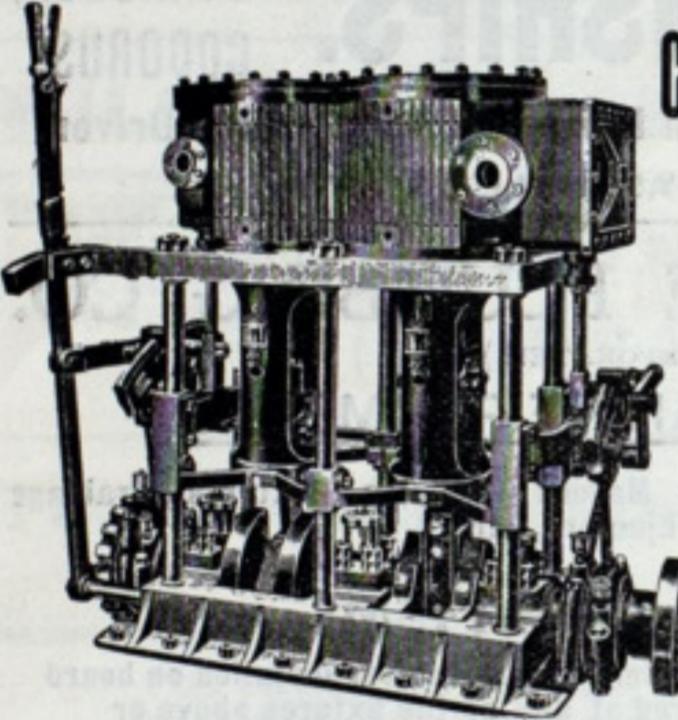
OLDS MOTOR WORKS, 1323 Jefferson Ave., DETROIT, MICH.
STATIONARY ENGINES 1 TO 50 H.P.



Chas. P. Willard & Co.
45-49 S. Canal St., CHICAGO.

BUILDERS OF
Marine Engines and Boilers,
Paddle Wheel Engines,
Boat Machinery,
High Pressure, Compound and
Triple Expansion Engines,
Yachts and Launches.

WRITE FOR CATALOGUE.



ELECTRIC BOAT COMPANY,

100 Broadway, NEW YORK.

BINDING OF CHARTS.

Navigators' charts, when backed with linen and taped around the edges, will last for years.
They lie flat and are not injured by handling.
Torn charts are very annoying.
The backing and taping of charts is a specialty with

THE MARINE REVIEW PUBLISHING CO.,
PERRY-PAYNE BUILDING, CLEVELAND, O.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

Photographs of Ships.

ALL TAKEN WITHIN THE PAST FEW WEEKS NEAR THE HEAD OF ST. CLAIR RIVER. LARGE PRINTS (11 X 14 INCHES PICTURE SIZE), AND NO BACK GROUND TO MAR THEIR BEAUTY. CLEAR SKY AND OPEN WATER NEAR THE FOOT OF LAKE HURON.

STEAMERS.

ANGELINE
BIRCKHEAD, P. H.
BOSTON
BOYCE, MARY H.
BUFFALO (two views).
CITY OF ALPENA
(Side-wheeler)
CONESTOGA AND MONARCH
(on one print)
DAVIDSON, THOS.
DELAWARE
EDDY, JOHN F.
HANNA, M. A.
HARPER, JOHN
HOPKINS, MARK
HURON
IOSCO
IRON KING
KALIYUGA,
LEAFIELD
LINN, WM. R.
McWILLIAMS, JOHN J.
MARUBA
MARIPOSA

MATAAFA
MILLS, ROBT.
NICHOLAS, I. W.
NICOL, JOHN M.
NORTHERN LIGHT
NORTHERN KING
PENOBSBOT
PITTSBURG (Pass. steamer)
PONTIAC
PRIDGEON, JOHN, JR.
PRINCETON
QUEEN CITY
RAVENS CRAIG.
REES, W. D.
REIS, WM. E.
RHODES, W. C.
SACRAMENTO
SAXON
SUSQUEHANNA
SPARTA
STEVENS, W. H.
SYRACUSE
TUSCARORA
WILBUR, E. P.

TOW BARGES.

ABYSSINIA, CHATTANOOGA
OLIVE JEANETTE

ANY OF THESE PICTURES—THE LARGEST OFFERED FOR SALE ON THE LAKES—AT \$1.50 FOR A SINGLE PRINT OR \$5.00 FOR FOUR, delivered. If called for at office of Marine Review, single prints may be had at \$1.25.

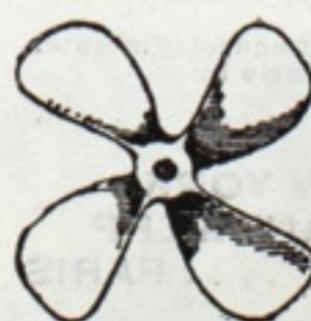
THE MARINE REVIEW PUB. CO.,

Perry-Payne Bldg., Cleveland.

MacKinnon Manufacturing Co.

Boilers Makers, Founders and Machinists.

Marine Boilers, Engines and Shipyard Machinery. Most powerful set of Hydraulic Slings on the Lakes. Best Towing and Speed Propeller Wheels made.



SPECIALTY SMALL YACHT WHEELS.

Works and Office, 224-230 N. Water Street, BAY CITY, MICH.

DIXON'S Graphite Pipe Joint Compound

Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DELTA METAL

THE PHOSPHOR BRONZE SMELTING CO. LIMITED,
2200 WASHINGTON AVE., PHILADELPHIA.
"ELEPHANT BRAND PHOSPHOR-BRONZE"
INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.
— DELTA METAL —
CASTINGS, STAMPINGS AND FORGINGS.
ORIGINAL AND SOLE MAKERS IN THE U. S.

PROPELLEERS.

HENRY R. WORTHINGTON, PUMPING MACHINERY.

MARINE AIR AND FEED PUMPS

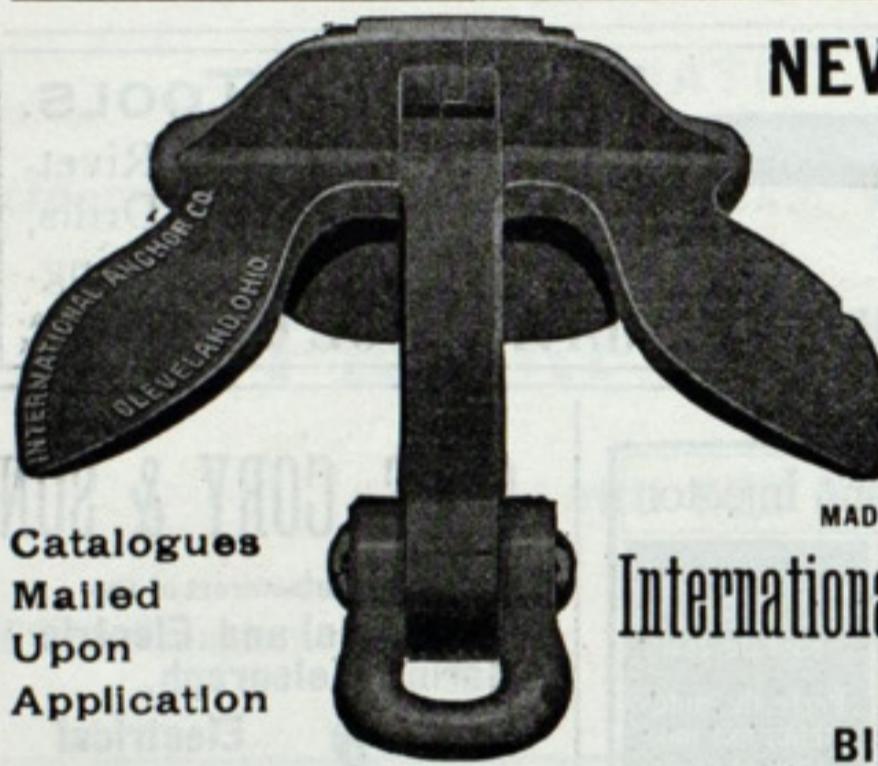
A SPECIALTY.

WATER METERS.

BOSTON,
CHICAGO,
PHILADELPHIA,
ST. LOUIS,
BUTTE.

120 Liberty St., NEW YORK.

CLEVELAND.
PITTSBURG.
ATLANTA.
SAN FRANCISCO.
NEW ORLEANS.



Catalogues
Mailed
Upon
Application

NEW PATENT**STOCKLESS
ANCHOR**

MADE BY THE

International Anchor Co.CLEVELAND, O.
BINGHAMTON, N. Y.

FRED'K BALDT, President. W. M. GELSTON, Vice-President
W. S. BICKLEY, Sec'y and Treas.

Baldt Patent Stockless Anchor.

Made of the finest quality of open-hearth steel, and constructed on the ball and socket principle. Many points of superiority over ordinary stockless anchors.

BALDT ANCHOR COMPANY
CHESTER, PA.

WALTER MILLER, Perry-Payne Building,
CLEVELAND, O.

Representative for the Great Lakes. We
keep a large number of Anchors in stock.

**The Martin-Barris Co.**

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,
AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR
CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank,

CONSTANTLY ON HAND AND SAWED TO ORDER
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, O.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

**M. T. DAVIDSON,
PUMPS.**

CONDENSERS. **ASH EJECTORS.**

BAIRDS EVAPORATOR.

133 Liberty Street, **NEW YORK.**

THE GEO. F. BLAKE MFG. CO.**MARINE****PUMPS.**

91 Liberty St., NEW YORK.

BOSTON. CHICAGO. PHILADELPHIA. LONDON.

Howard H. Baker & Co.

SHIP CHANDLERS
AND **SAIL MAKERS,**

18 to 26 Terrace, BUFFALO, N. Y.

Books for Ship Builders.

HIGH-CLASS STANDARD WORKS

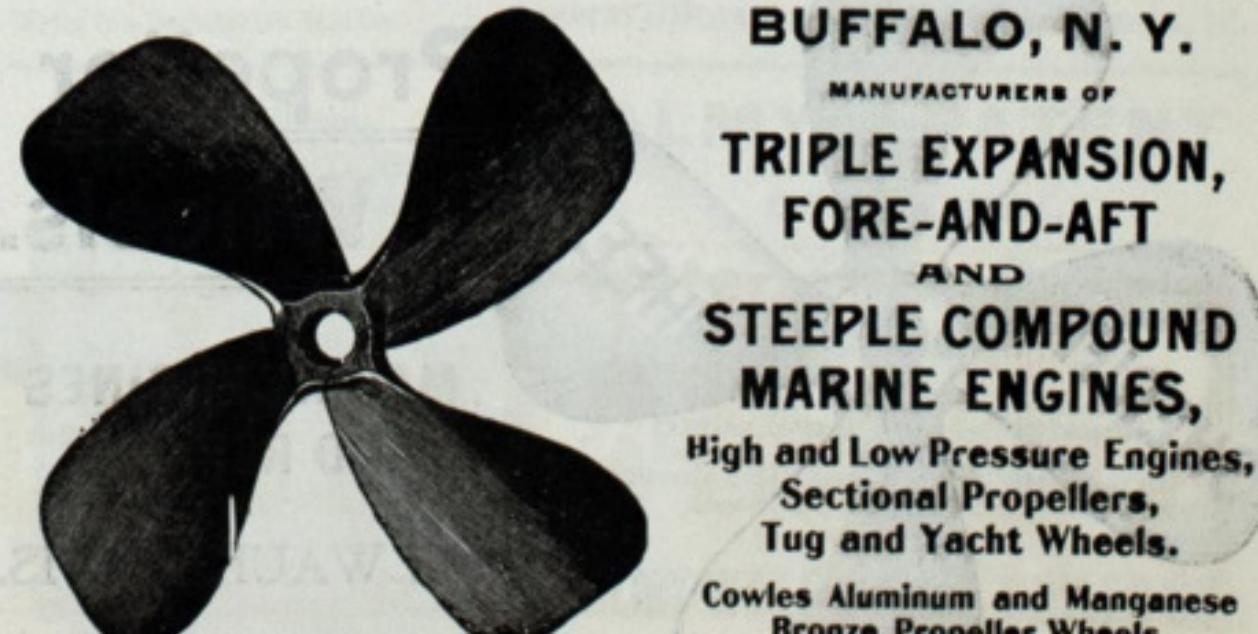
that are used all over the world.
A MANUAL ON LAYING OFF IRON AND STEEL
VESSELS. Thomas H. Watson. \$5.
NAVAL ARCHITECT'S AND SHIP BUILDER'S
POCKET BOOK. Clement Mackrow. 700
pages. \$5.
NAVAL ARCHITECTURE. Sir William White,
chief constructor of the English
Navy. Fifth edition. 750 pages. \$9.
THE MARINE REVIEW PUBLISHING CO.,
PERRY-PAYNE BLDG., CLEVELAND.

THE MORSE ELEVATOR

RECEIVED THE
HIGHEST AWARD
AT THE
National Export Exposition, Philadelphia 1899.

MORSE, WILLIAMS & CO.
PHILADELPHIA.

**H. G. TROUT,
KING IRON WORKS,**
BUFFALO, N. Y.



MANUFACTURERS OF
**TRIPLE EXPANSION,
FORE-AND-AFT
AND**

**STEEPLE COMPOUND
MARINE ENGINES,**

High and Low Pressure Engines,
Sectional Propellers,
Tug and Yacht Wheels.

Cowles Aluminum and Manganese
Bronze Propeller Wheels.

These Wheels are noted for their extra speed, towing power and proportionate saving of coal.
Prices Quoted on Application.

Mott's "Richmond" Pump Closet.



Established 1828.

THE "Richmond" is the simplest, quickest and easiest working Closet made. It has been endorsed by all who have seen it. We also manufacture a full line of Baths, Lavatories and other Sanitary goods for Marine Work.

—THE—
J. L. MOTT IRON WORKS,

84-90 Beekman St., NEW YORK CITY.
332 Boylston St., BOSTON, MASS.
1128 Walnut St., PHILADELPHIA, PA.

Send for Circular and Price List.

Scott's Coast Pilot for 1900.

Great Lakes and Connecting Waters,

AT \$1.50.

For sale by MARINE REVIEW PUB. CO.



Queen City Patent Hydraulic Steerer.

The Best and Most
Reliable.Generates No Heat
In Pilot House.

Has Large Hand
Wheel.
Can be Changed from
Power to Hand
Steering Instantly.
A Favorite with Pilots.
Send for References.

Queen City Engineering Co., Buffalo, N. Y.

ALFRED B. SANDS & SON.
MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties.

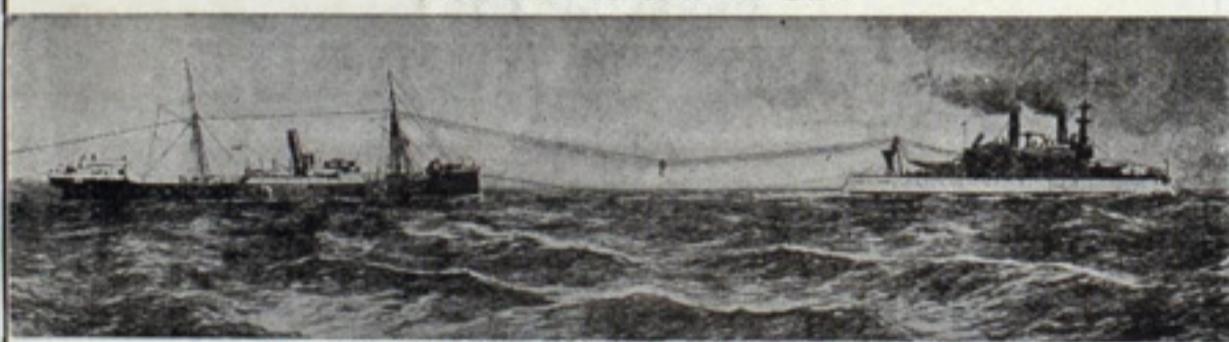


Marine Water Closet for either above or
below water line.
Folding Lavatories, Ventilators, Pumps,
Tanks, &c., &c.

134 BEEKMAN ST., NEW YORK.

THE LIDGERWOOD-MILLER-MARINE CABLEWAY

WILL TRANSFER COAL, AMMUNITION, SUPPLIES AND PROVISIONS,
FROM SHIP TO SHIP AT SEA.



THE ONLY PRACTICAL DEVICE FOR COALING AT SEA.

LIDGERWOOD STEAM AND ELECTRIC HOISTS FOR WAR VESSELS, STEAM-SHIPS, WAREHOUSES AND DOCKS. Send for Catalogue.

LIDGERWOOD MFG. CO., 96 LIBERTY ST., NEW YORK.

SHERIFFS MANUFACTURING COMPANY,

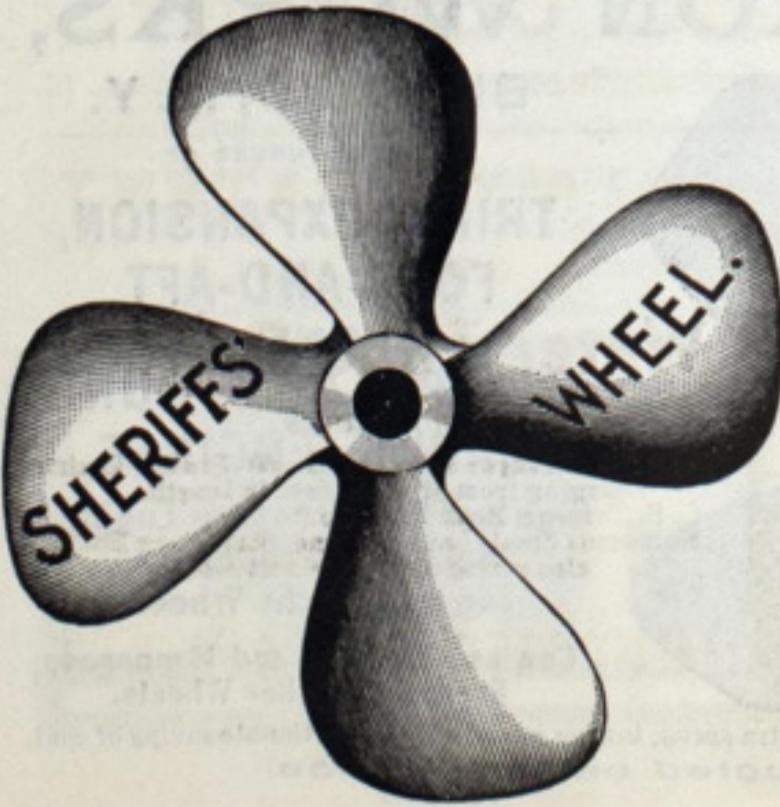
MANUFACTURERS OF

Propeller Wheels.

MARINE ENGINES
AND REPAIRS.

MILWAUKEE, WIS.

TELEPHONE S.-163.



MARINE CHAIN

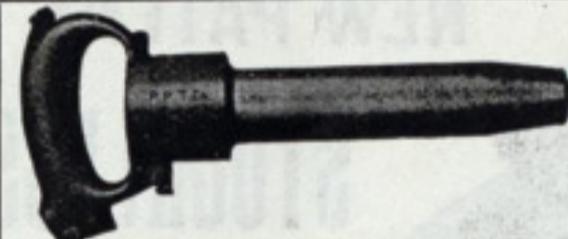
OF ALL KINDS.

*Ships Cables, Dredge Chains,
Stud Link and Marine Railway Chains,
Steam Shovel Chains, Boom Chains, Etc.*

CERTIFICATE OF TEST FURNISHED.

STANDARD CHAIN CO.

PITTSBURGH, PA.



PNEUMATIC TOOLS.

Chipping Hammers, Riveting Hammers, Piston Drills,
Rotary Drills, Everything.

PHILADELPHIA PNEUMATIC TOOL CO. PHILA., PA. NEW YORK

Sellers' Restarting Injector



A strictly first class machine at moderate cost.

Perfectly automatic, has wide range of capacities, and raises water promptly with hot or cold pipes.

Very simple, has few parts and is easily repaired.

All parts interchangeable, made of the best bronze, and the workmanship is perfect. Send for special catalogue descriptive of this Injector.

JENKINS BROTHERS, Selling Agents
NEW YORK, BOSTON, PHILA., CHICAGO

CHAS. CORY & SON,

Manufacturers of the
Mechanical and Electric
Marine Telegraph,

Electrical
Helm Indicators
Electric Call
Bells.

Engine Bells and
Brass Work of
all descriptions,
Shrieking and
Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

The "WEBSTER"

MARINE TYPE

OF FEED HEATER

This Heater possesses exclusive features of economic advantage. Hot well boiler feed re-heated with the exhaust steam from auxiliaries or elsewhere, effecting large economy in fuel or increase in power developed. Reduces boiler repairs.

The Heater is automatic in its operation; practically no attention is required.

No Internal floats are used.

All Parts are readily accessible.

Heaters designed to fit in special locations.

Construction details and further particulars will be furnished upon inquiry.

WARREN WEBSTER & CO., CAMDEN,
NEW JERSEY.

THE BABCOCK & WILCOX CO.

ZENITH CITY,
QUEEN CITY,
EDNA G.,
CRESCENT CITY,
SUPERIOR CITY,
EMPIRE CITY,

ALEX McDougall,
PRESQUE ISLE,
MATAAFA,
MAUNALOA,
MALIETOA,
JOHN W. GATES,

JAMES J. HILL,
ISAAC L. ELLWOOD,
WM. EDENBORN,
W. S. GRATTAN,
HARVARD,
LAFAYETTE,

CORNELL,
PRINCETON,
RENSSELAER,
PARAGUAY,
ASUNCION.

HAVE EQUIPPED THE FOLLOWING
LAKE VESSELS WITH THEIR
FORGED STEEL WATER TUBE
BOILERS:

BOILERS NOW UNDER CONSTRUCTION FOR U. S. MONITOR WYOMING,
U. S. CRUISER CINCINNATI,
U. S. CRUISER RALEIGH,
U. S. CRUISER TACOMA,
U. S. CRUISER GALVESTON,
U. S. CRUISER CHATTANOOGA,
U. S. CRUISER DENVER,
U. S. CRUISER DES MOINES,
U. S. CRUISER CLEVELAND,
AND SEVERAL LARGE VESSELS FOR THE PACIFIC COAST.

The Babcock & Wilcox Co.,
29 CORTLANDT ST.,
NEW YORK.

THE BUFFALO DRY DOCK CO.

SITUATED AT GANSON ST. AND BUFFALO RIVER.

Operating two docks, derricks, etc., and in every way equipped with modern machinery for

PROMPT AND ECONOMICAL REPAIRS

AND FOR THE BUILDING OF STEEL AND WOODEN SHIPS.

Office Telephones: { 279
1327
1905

Residence Telephone, Bryant 209.

EDWARD SMITH,
President.

THE ROBERTS BOILER CO.

HAS BUILT OVER 1000 BOILERS TO DATE

For Launches, Yachts, Passenger and Freight Steamers,
Dredges, Tugs, Stern-wheelers, Canalers;
Also for Navy Department, War Department, Treasury Department,
Light-House Board and Revenue Cutter Service;
Also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

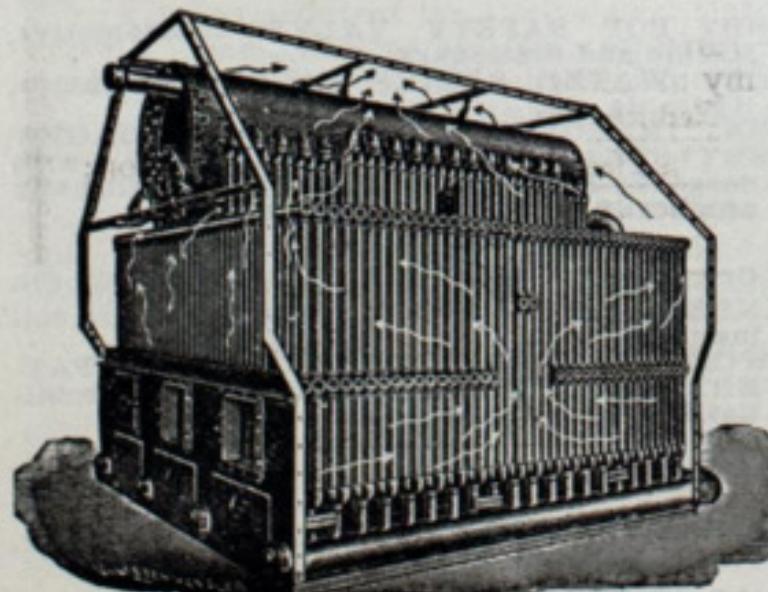
SAFETY AND ECONOMY.

NEVER KILLED A MAN OR HAD A SERIOUS ACCIDENT. \$250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every boiler warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

THE ROBERTS SAFETY WATER TUBE BOILER CO.,
Works, Red Bank, N. J. 39 and 41 Cortlandt St., NEW YORK CITY.

TELEPHONE: { NEW YORK OFFICE, 599 CORTLANDT.
OFFICE OF WORKS, 49 RED BANK, N. J. Cable Address,
"BRUNIVA, NEWYORK."

THE "TAYLOR" YACHT BOILER



Has held the record three seasons on the fastest yacht on the great lakes.

Guaranteed against
Rupture of Tubes.

Will not Prime in the
Roughest Sea.

MANUFACTURED BY

Detroit Screw Works,
FOOT OF REOPPELLE ST.,
DETROIT, MICH., U. S. A.

ALL THE NAVIES OF THE LEADING GOVERNMENTS
OF THE WORLD USE
The Niclausse Water Tube Boiler,

ADOPTED BY THE NAVIES OF
UNITED STATES, RUSSIA, SPAIN,
ENGLAND, ITALY, Argentine Republic,
FRANCE, GERMANY, CHILI.

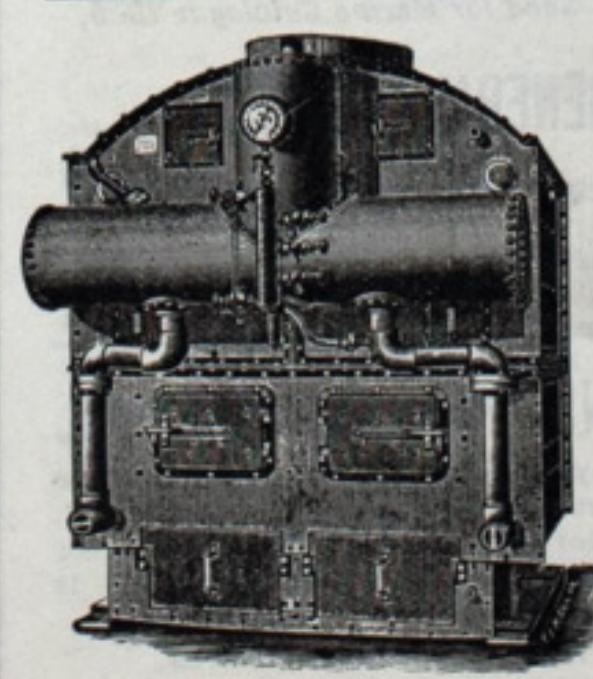
We have now in course of construction at our Works 60,000 H. P. Niclausse
Boilers for the following war vessels:

U. S. Monitor CONNECTICUT, { Building at the Ship Yard of the Bath
Iron Works, Bath, Me.
U. S. Battleship MAINE, { Building at Wm. Cramp & Sons Ship
Russian Battleship RETVIZAN, Yards, Philadelphia.
Russian Cruiser VARIAG,

THE STIRLING COMPANY,

Write for Descriptive Matter.

General Offices Pullman Building, Chicago, Ill.



ALMY'S PATENT
SECTIONAL
Water Tube Boilers.

NOW USED IN
Thirty Passenger Boats and 100 Steam Yachts
ranging from 50 to 250 feet in length,
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boiler
also giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

178-184 Allens Avenue,
near Rhodes St.

PROVIDENCE, R. I.

BUFFALO FORGE COMPANY ENGINES

HORIZONTAL, VERTICAL and MARINE TYPES,
SIMPLE and COMPOUND.

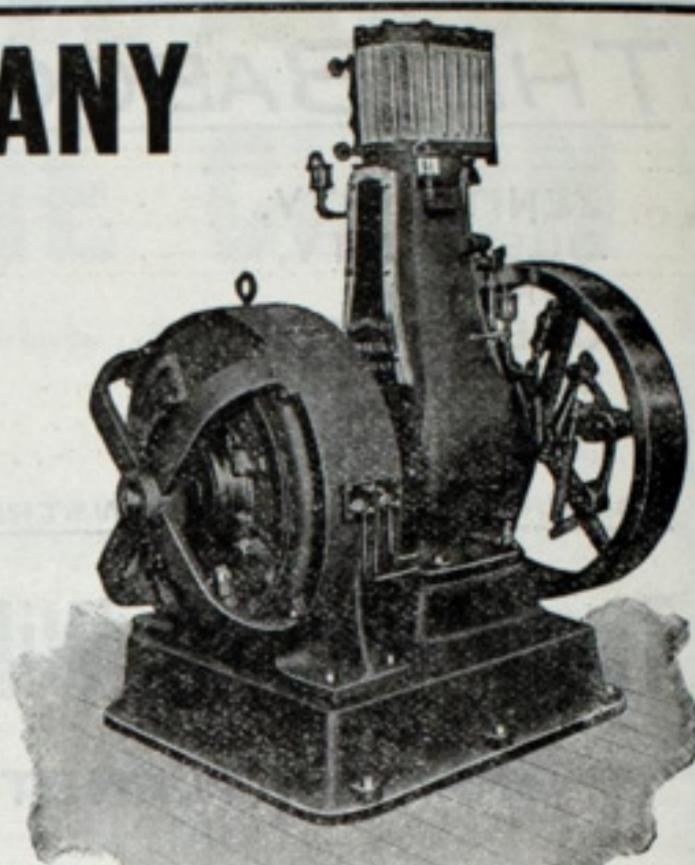
MARINE LIGHTING SETS.

BUFFALO FORGE COMPANY,

BUFFALO, N.Y.

NEW YORK.

CHICAGO.



Buffalo Marine Engine, arranged for direct connection to Generator.

Buffalo Upright Engine, direct connected to Marine Type Generator.



The illustration shows a machine designed especially for cutting sheet metal. It is a continuous shear made in three sizes. The cut shows the largest size, the No. 4 B. The smallest size cuts up to 3-16-inch sheets, the next size to 5-16, and the machine shown cuts up to $\frac{1}{2}$ -inch sheets. They all cut sheets of any width or any length. These machines are shipped complete and ready for use. They are made especially for the use of boiler makers and sheet metal workers. The two larger sizes can also be supplied with a special attachment for beveling sheets.

Punching and Shearing Machinery.

JANESVILLE, WISCONSIN, U. S. A.

ASHTON

CAM LEVER POP SAFETY VALVES
AND NON-CORROSIVE STEAM GAGES
give highest efficiency and durability. Specify them
and get the best.



THE ASHTON VALVE CO.,

BOSTON, NEW YORK
AND CHICAGO, U. S. A.



THE BOURNE-FULLER CO.

CLEVELAND O.

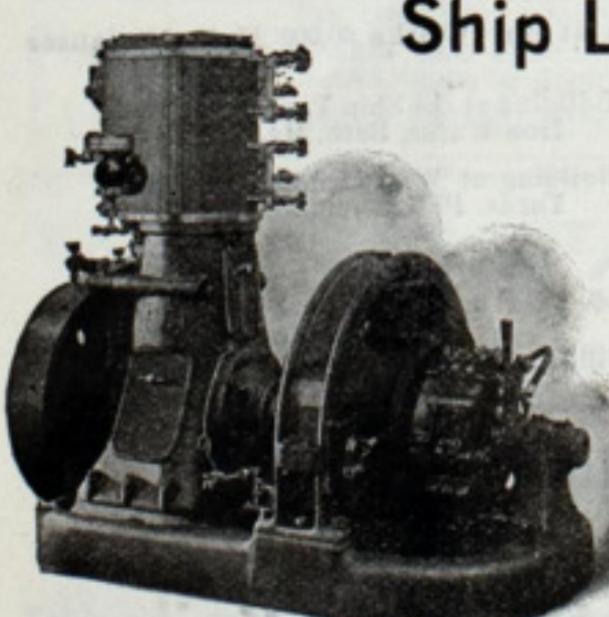
BAR IRON.

PIC IRON.

ARCHES AND STRAPS FOR WOODEN VESSELS.

BOILER RIVETS. BOILER TUBES. BRACE IRON.
IRON AND STEEL SHEETS. MACHINERY AND TOOL STEEL.
BESSEMER AND OPEN HEARTH STEEL.
SHIP PLATES, BOILER PLATES, SHIP RIVETS.
BEAMS, CHANNELS, ANGLES, BARS, AND OTHER SHAPES.
BILLETS, BLOOMS AND FORGINGS.
"BYERS" FULL WEIGHT WROUGHT IRON PIPE.

GENERAL ELECTRIC COMPANY'S Ship Lighting Sets



A NAVY SET—25 Kw GENERATOR,
TANDEM COMPOUND ENGINE.

Engines—Single or
Tandem Compound.
Generator Capacities
 $2\frac{1}{2}$ to 75 kilowatts.

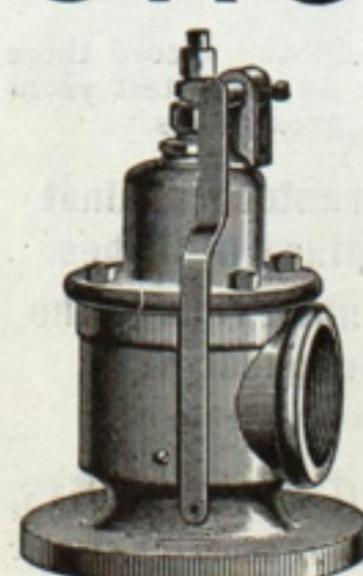
Send for Marine Catalogue 1025.

GENERAL OFFICE:
SCHENECTADY, N. Y.

Sales Offices in all Large Cities.

CROSBY STEAM GAGE AND VALVE CO.

CROSBY POP SAFETY VALVES. Locomotive,
Marine and Stationary.
CROSBY WATER RELIEF VALVES, for Pumps,
Hydrants, etc.
CROSBY IMPROVED STEAM PRESSURE GAGES
CROSBY STEAM ENGINE INDICATORS, with
Sargent's Electrical Attachment for taking any
number of Diagrams simultaneously.



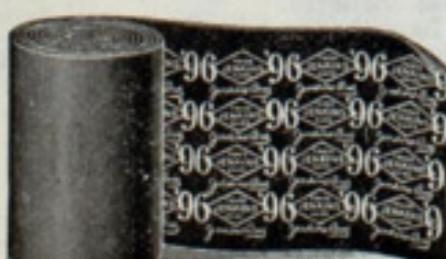
The Original SINGLE BELL CHIME WHISTLES.
BRANDEN PUMP VALVES; rubber with wire-coil
insertion.
BOSWORTH FEED-WATER REGULATOR, PAT-
ENT GAGE TESTER, and many other special-
ties in Steam Lines.

Main Office and Works: Boston, Mass.
Stores: Boston, New York, Chicago, and London Eng.

JENKINS '96 PACKING.

Pronounced by steam users throughout the
world the best joint packing manufactured.
Expensive? Not at all, as it weighs 30% less
than many other packings, consequently is
much cheaper.

JENKINS BROTHERS,
NEW YORK BOSTON PHILADELPHIA CHICAGO



WE WILL REPAIR YOUR STEAM FITTINGS PROMPTLY.